Smithsonian

APRIL 1999

A Great Blue Heron Looks Out from Its Rookery At a Promising Future

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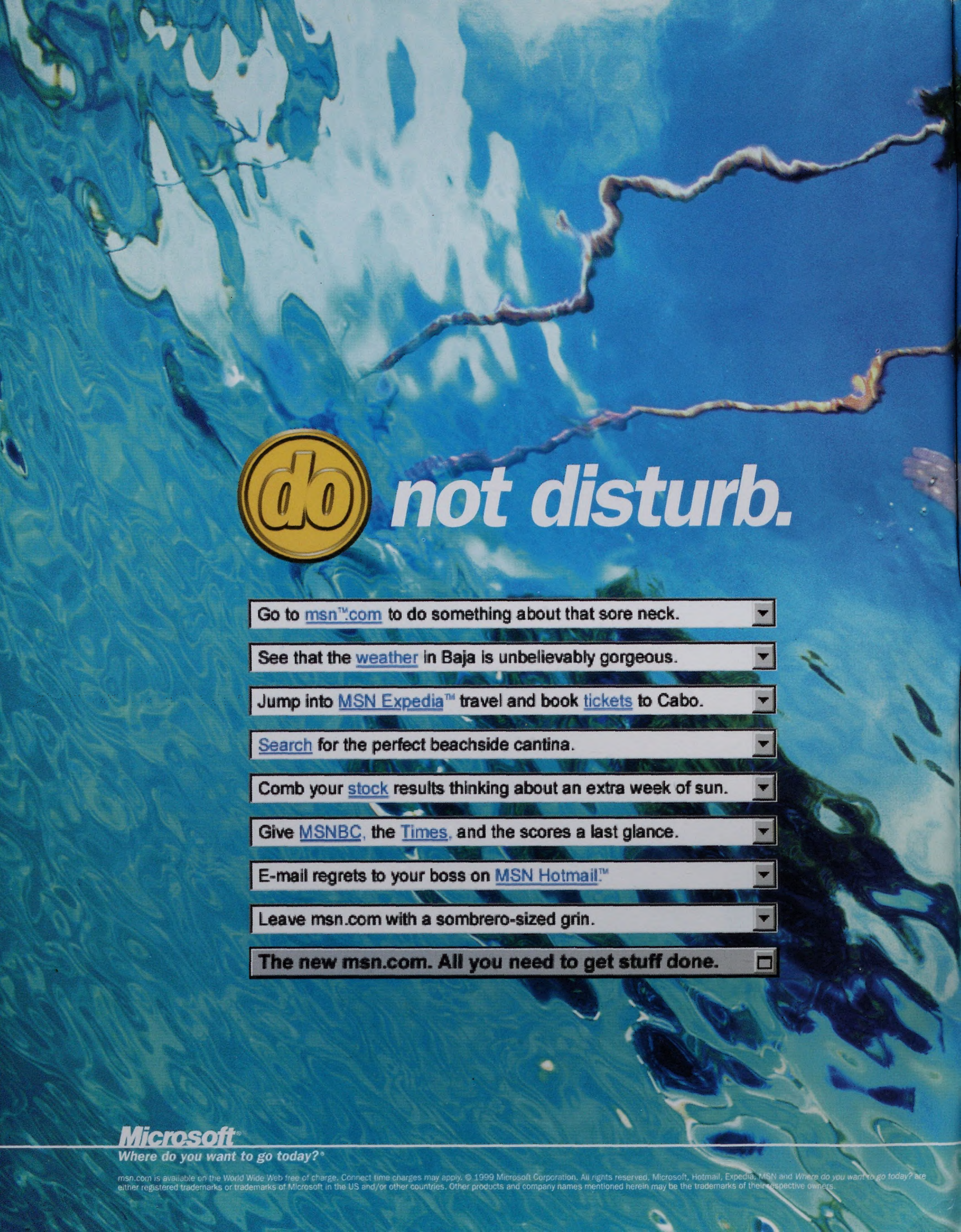
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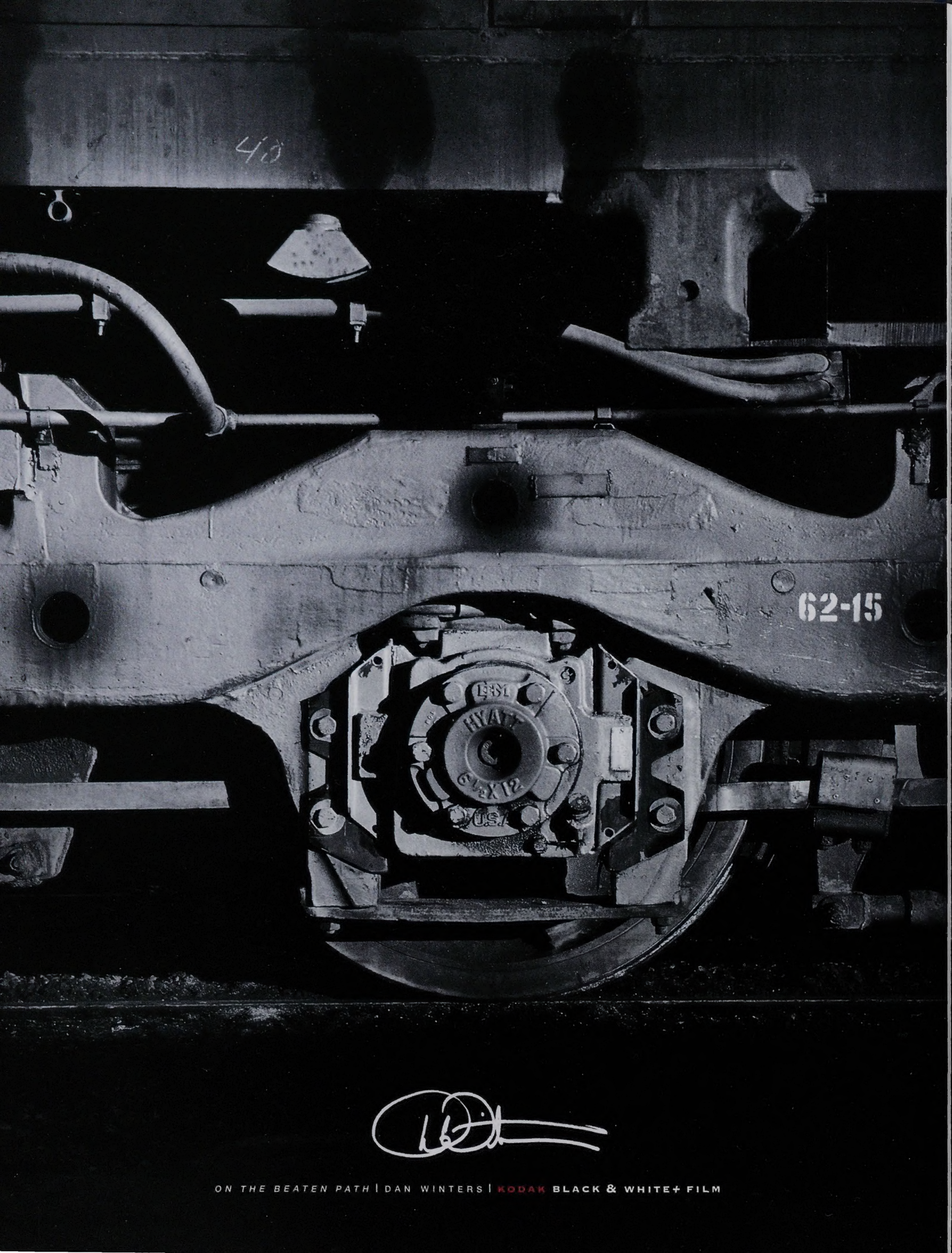

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SMITHSONIAN

departments

APRIL 1999 ♜ VOLUME 30, NUMBER 1

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Cover An adult great blue heron rests in a pine between foraging flights at Smith Island, Maryland, in Chesapeake Bay. Although the plumage of adult males and females is similar, individual herons can be recognized by variations in their facial markings.
PHOTOGRAPH BY DAVID HARP

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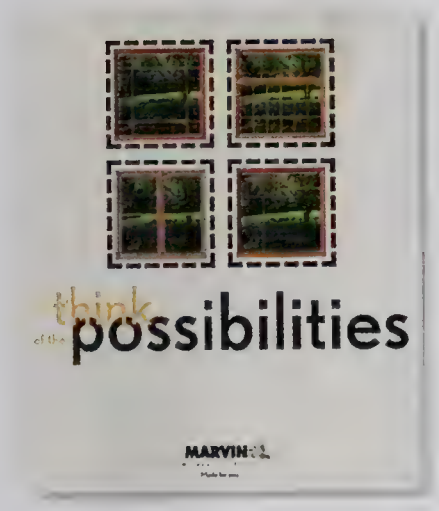

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SMITHSONIAN PERSPECTIVES

A Museum Partnership

WORKING TOGETHER, THE SMITHSONIAN'S FREER AND SACKLER GALLERIES ARE GAINING DISTINCTION IN ASIAN ART

PREVIOUSLY I DEVOTED THIS COLUMN TO THE extraordinary exhibition at the Arthur M. Sackler Gallery "King of the World: A Mughal Manuscript from the Royal Library, Windsor." Today I write more broadly about the synergism born of joining the young Sackler Gallery with the venerable Freer Gallery of Art, which are working collaboratively as a national museum of Asian art for the United States.

When the Freer opened in 1923 with a collection of some 7,500 works of mostly East Asian art and 1,500 examples of American art, all donated by collector Charles Lang Freer, the Smithsonian was already a fortunate institution. Freer, though self-taught, proved to have a discerning eye for quality and a sharply focused vision of a museum dedicated to the study of the most distinguished examples of Asian and 19th- and early-20th-century American art. The Freer has continued to acquire superb works of East Asian and South Asian art and has assembled one of the world's great collections of the arts of the Islamic world.

With a gift of art and funds from Dr. Arthur M. Sackler, the late New York medical publisher, the Sackler Gallery was inaugurated as a separate museum in 1987 to increase the range of Asian art at the Smithsonian and to develop an international loan exhibition program. The Sackler shares the Freer's focus on historical Asian art but extends its scope to include the contemporary world, embracing a wider range of media and art. The two museums, which are physically connected, maintain separate collections but are administered by a single staff.

Much planning has been invested in this arrangement, and as I review the Sackler's 12 years and the Freer's 75, I see that the strategy is succeeding. Among the museums' offerings last year were an exhibition reflecting Charles Lang Freer's passion for Egyptian art and, at the Sackler, an exhibition of Chinese-influenced paintings by American artist Roy Lichtenstein. Forthcoming projects include a display of traditional Japanese tea wares from the Freer's collection, while the Sackler exhibits two newly acquired large black-and-white photographs of women in veils by the contemporary Iraqi artist Jananne al-Ani.

The founders of the Freer and the Sackler were both committed to educating the public about Asian art and promoting art scholarship. The museums are known internationally for welcoming researchers to study the collections, as well as for the quality of their publications and scholarship. Members and benefactors have generously donated art and funds to expand the collections.

The Sackler and the Freer together house the largest Asian art research library in the United States. The library collection consists of 60,000 volumes, including nearly 2,000 rare books. Half of the volumes are written and catalogued in Asian languages, and the facility is a major resource for scholars around the world. A recent endowment ensures that the acquisition of books will continue.

Other recent gifts to the museums support behind-the-scenes projects. From 1992 to 1995, for example, grants from the Art Research Foundation in Tokyo funded the conservation of Japanese paintings in the museums' East Asian Painting Conservation Studio. The success of that collaboration led to a new endowment to maintain a Japanese conservation training program at the museums.

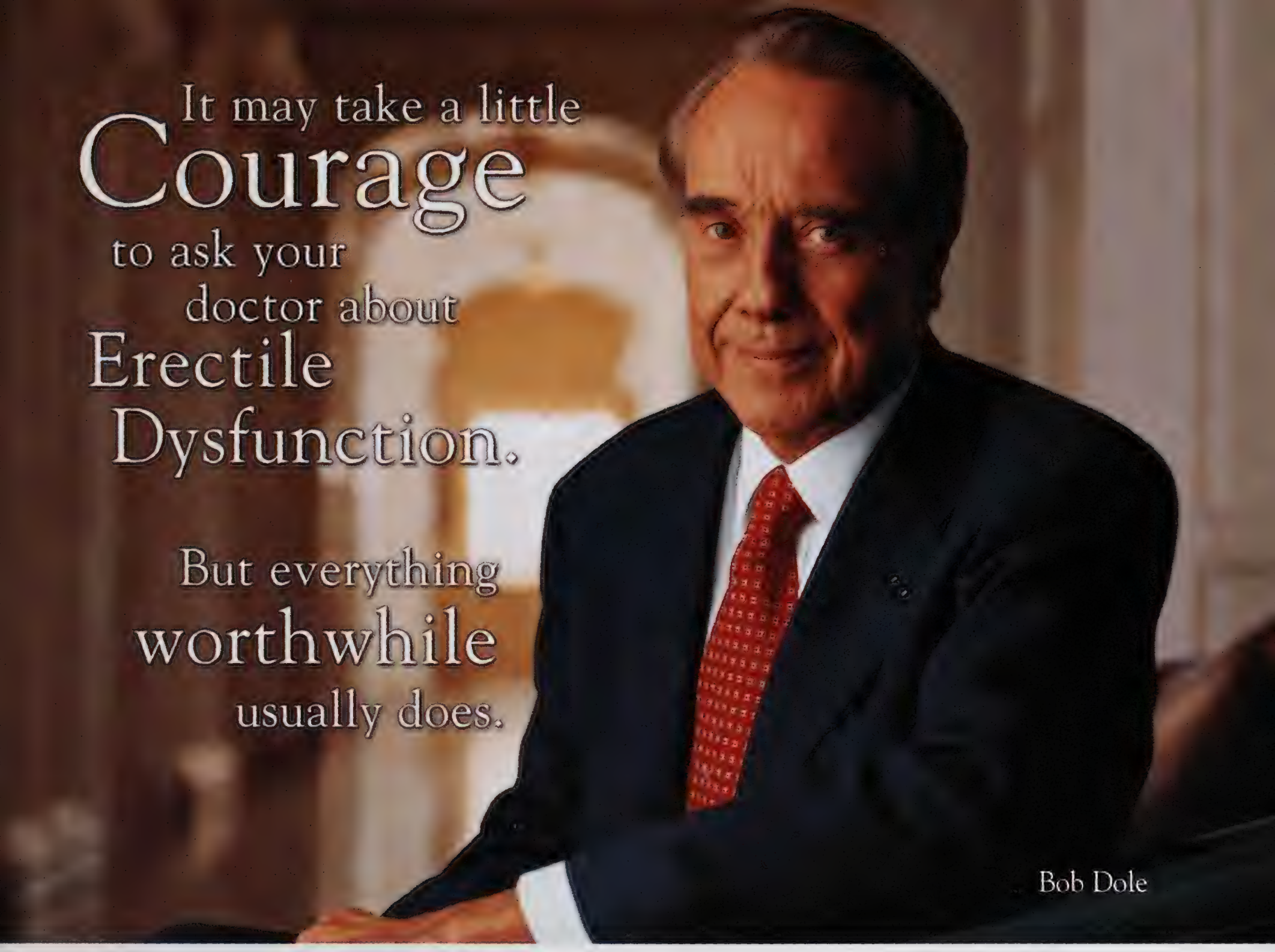
Further support for conservation arrived in a grant from the Andrew W. Mellon Foundation. Under the grant, conservation scientists are investigating the use of laboratory methods to prevent deterioration of East Asian paintings.

Technology is another aspect of the Freer and Sackler mandate. The museums received Smithsonian funds to digitize and store on disks 12,000 color transparencies of art in the collections. When the project is complete, the images will be part of an Institution-wide database offering public electronic access to all Smithsonian collections.

Electronic access has special meaning for the Freer, an institution that promised its founder never to lend objects from the collection, a restriction that does not apply to the Sackler. While adhering to Freer's wishes, the staff is working hard to "circulate" the collection through publications and new applications of technology.

In engineering alliances among the traditions and facilities of the two museums while actively seeking resources to support dozens of new projects, we are making sure that Freer and Sackler visitors can look forward to a continuation of learning and enjoyment far into the future.

I. MICHAEL HEYMAN, SECRETARY



When I was diagnosed with prostate cancer, my first concern was ridding myself of the cancer. But I was also concerned about possible postoperative side effects, like erectile dysfunction (E.D.), often called impotence. So I asked my doctor about treatment options.

I'm speaking out now in the hope that men with E.D. will get proper treatment for a condition that affects millions of men and their partners.

Most E.D. cases are associated with physical conditions or events, like the prostate cancer surgery I underwent. The most common causes of E.D. include diabetes, high blood pressure, spinal cord injury, or surgery for the prostate or colon. E.D. can also be associated with smoking, alcohol abuse, or psychological conditions such as anxiety or stress.

The good news is that many effective treatments are available for E.D. But the important first step is to talk to your doctor. Together, you and your doctor can decide which treatment is best for you.

Now it's up to you to get the treatment you need for E.D. My advice is to get a medical checkup. It's the best way to get educated about E.D. and what can be done to treat it. It may take a little courage, but I've found that everything worthwhile usually does.

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LETTERS TO

THE EDITOR

JOHN SINGER SARGENT

AS I READ STANLEY MEISLER'S ARTICLE on John Singer Sargent in the February issue, I turned page 65 and beheld what must be a first: a SMITHSONIAN centerfold, the infamous *Madame X*. Will the world ever be the same? As a long-time subscriber, I must say that I love it.

Bill Gerhauser
Trenton, New Jersey

MY CRITERION FOR A GOOD ART MUSEUM is that it have at least one painting by John Singer Sargent. I found one oddity about the layout of your article: you did not run a picture of the artist.

Charles W. Sargent
San Antonio, Texas

At right is Sargent's *Self-Portrait*, which he painted in 1906. Ed.

IF THERE IS INDEED A HEAVEN SOMEwhere, both John Singer Sargent and Lady Agnew of Lochnaw most certainly belong there.

Angel Medina
Fort Lee, New Jersey

BAR CODES

THE TIMING OF THE ARTICLE BY ED Leibowitz on bar codes was perfect: the Indiana Department of Revenue has just initiated its own bar code project for this year's tax filing season, and we are the first state to try this experiment. Electronic transmission is the fastest method of filing a tax return, but some of our citizens still like holding and seeing hard copy.

Our new project enables taxpayers to key in their tax information on our Website, at any of our 12 district offices or at H & R Block. Our program generates a printed copy of the tax return that has a bar code on the top corner. Once the taxpayer has sent us the hard copy, we scan the bar code, which contains all the data on the tax form and the taxpayer's W-2 information.

It takes us four hours to process 90 tax returns when we have to key in the information ourselves. The error rate is 14 to 15 percent. We can scan the bar codes of 90 returns in 12 to 15 minutes, and the error rate is less than 1 percent.

Bar coding may bridge the gap between a taxpayer's desire for paper and our need for electronic processing of tax returns. And it may mean we can chop down fewer trees.

Kenneth L. Miller, Commissioner
Indiana Department of Revenue
Indianapolis, Indiana

BAR CODES HAVE MADE THEIR WAY into space. The International Space Station (ISS) program is affixing them to the on-orbit loose and stowed items (food, tools, notebooks, tape recorders, diagnostic and measuring equipment for hardware, et cetera) and spare parts for hardware.

The Russian cosmonauts lost many items on-orbit on MIR and pushed for a better inventory system for the ISS, which resulted in bar codes. It took a while for the astronauts to accept certain "grocery clerk" tasks, but they realized the benefits of knowing what they have, where it is and what condition it's in.

These on-orbit bar codes will interface with the Consolidated, Maintenance and Inventory Planning system in the Mission Control Center, which is located in Houston, Texas.

Ken Zingrebe
International Space Station
Houston, Texas

YOUR ARTICLE CITED THE widely reported encounter between President George W. Bush and the bar-code scanner. At the February 1992 convention of the National Grocers Association, held in Orlando, Florida, Bush watched a demonstration of what was then the latest in scanner technology. It was able to accurately "read" a ripped or damaged bar code. Bush was amazed at the sophistication of the latest technology that could take a mangled bar code, reassemble it and still come up with the correct data.

Susan LaBarge
Grand Rapids, Michigan

CURLING

BEING A CURLER FROM MAPLETON, Minnesota, I thoroughly enjoyed Bruce Watson's article on the "roaring game." As a sport, curling is cerebral yet physical; competitive yet friendly; frustrating yet rewarding. When trying to explain our sport, we curlers are accustomed to blank stares and dumbfounded looks. We wonder if people get it. Mr. Watson did.

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Tim Solie
Mapleton, Minnesota

ALL OF MY MOTHER'S FAMILY WERE from the Mapleton area, and they were fanatics about curling. I have my grandfather's curling stone proudly displayed in my living room, and it never fails to elicit a response or curious stare from my friends and the locals here in Tennessee.

David Ferris
Lewisburg, Tennessee

WHILE MY HUSBAND WAS ASSIGNED to Elmendorf Air Force Base in Anchorage, Alaska, the officers wives' club organized a curling team, and I was introduced to the sport. All of my ancestors were Scottish, so I must have had some genes that helped me enjoy curling, and I proved it by winning a trophy.

I have happy memories of my 4-year-old daughter accompanying me to every match and learning to push the stones around.

Grace M. Douglass
Sacramento, California

CALENDAR

THE ARTICLE BY DAVID EWING DUNcan was well researched and well written. One point needs to be clarified, however. It would be a mistake for anyone to celebrate the new century on January 1, 2000, because there is no reference anywhere to the year 0. The first year A.D. began in the year 1. If you add 2000 to that figure, you get 2001.

Reg Chase
Surprise, Arizona

YOUR ARTICLE DID NOT MENTION SOsigenes of Alexandria, the Egyptian astronomer and mathematician who advised Julius Caesar to adopt the Julian Calendar.

Rene Olivares
New York, New York

YOU REFERRED TO THE EGYPTIAN Khons and his Sumerian counterpart, Nanna, as goddesses. They were gods.

Lori Selke
San Francisco, California

DAVID EWING DUNCAN WAS A BIT unfair to Pope Gregory XIII in alluding to him as a "rather lackluster pope." After all, where would the whoopee-cushion, fake-vomit and bee-in-the-ice-cube industries be without his beneficence? He created their most celebrated day. Under the Julian Calendar, New Year's Day had been on April 1; Gregory's decree moved it to January 1. Those who clung to the old New Year were dubbed "April fools" and were made the objects of pranks and ridicule.

Gary Rubin
Chicago, Illinois

Y2K

THE OTHERWISE PERCIPIENT OBSERvations of Timothy Foote on reactions to the onset of millennial years are marred by one minor point.

While it is true that if *Time* magazine had been appearing in the year 1, it would have been published in Rome, the center of the civilized world, and the editors would have had little choice but to name Caesar Augustus as their Man of the Year, it is inconceivable that they would have awarded that honor to Leif Eriksson in the year 1000.

Most likely *Time* would have been published in Córdoba in southern Spain, the richest and most highly civilized city in the world of the tenth century, clearly outshining its only possible rivals: Cairo, Constantinople and Nanking. *Time*'s Man of the Year would have to have been Mohammad Abbu Amir al-Mansur (c. 938-1002), who was vizier to Caliph Hashim II, and eventually ruled supremely.

Under al-Mansur, Córdoba enjoyed more than a quarter-century of increasing prosperity with a stable cur-

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rency, and it was recognized throughout the world as the dynamic center of learning and science.

Robert Wernick
Sea Island, Georgia

SAKER FALCON

IN HER FINE ARTICLE ON THE IMPERiled saker falcon [below] of Mongolia, Adele Conover quotes biologist David Ellis as saying: "On another continent, this is the biome that the Comanche and Sioux found." This other continent is also home to a close relative of the saker, the prairie falcon (*Falco mexicanus*), which fills the same niche on our Great Plains and Great Basin. Our prairie falcon is declining as well, but presumably less so from the pressure of falconers. Other factors are at play here, particularly the continuing degradation of the entire Great Plains ecosystem.

Guy Tudor
Great Plains, New York

I ENJOYED READING ABOUT ADELE Conover's fascinating experiences as a participatory journalist in Outer Mongolia. The trip sounded more than a little hair-raising, especially when the writer came so close to losing an eye to the raptor's talons.

Karen Kemp
Raleigh, North Carolina

MY SINCERE THANKS TO YOU FOR Adele Conover's article on the saker falcon. Her descriptions and narrative are wonderful, and she has given your readers a sense not only of the life of a falcon but also of the outback of Mongolia.

Alphonse F. La Porta
Ambassador
U.S. Embassy
Ulaanbaatar, Mongolia

ADELE CONOVER'S TEXT AND DAVID Ellis' photographs magically transported me into a world of abandoned Soviet jeeps, a yurt and a hawk's nest. In a shrinking world where we've seen just about everything, Conover's exciting tale reminds us that some areas are still wild and deserve to remain so.

JoAnne Nazzaro
Brattleboro, Vermont

GOOD NEWS GARAGE

IT WAS UPLIFTING TO READ THE ARTICLE by Joyce and Richard Wolkomir about the philanthropic people of the Good News Garage. By providing an inexpensive means of transportation to those trying to get off welfare, the garage is offering them a chance at financial independence.

Maureen C. McShane
Austin, Texas

THE WORK THAT IS BEING DONE BY THE Good News Garage parallels a successful international program called Pedals for Progress. In the Third World, the bicycle is key to economic improvement for individuals and their communities. PFP has shipped more than 25,000 old bicycles to more than 15 countries.

Robert Nordvall
Gettysburg, Pennsylvania

THE OBJECT AT HAND

I FOUND "PICTURES OF A TRAGEDY" by Edwards Park, about Evelyn Nesbit, Stanford White and Harry K. Thaw, to be a very interesting article. It was also a great relief to be reminded that sex was not created in the last 30 years.

Melanie Hopkins
Cary, North Carolina

THE LOVE TRIANGLE OF NESBIT, THAW and White plays an important part in E. L. Doctorow's blend of fact and fiction in his 1975 novel *Ragtime*.

Robert S. Davis, Jr.
Hanceville, Alabama

I MET EVELYN NESBIT WHEN HER LIFE and times were to be made into *The Girl in the Red Velvet Swing*. The movie studio hired her as a technical adviser, and Roy Craft was assigned as her publicist to keep her happy and not troublesome about the script. He invited me to join them for lunch at the original Brown Derby.

Roy had told me that Evelyn was extremely loyal, and that it would soon show. She was by now a relaxed, pudgy little old lady, who chatted amiably about "back when." It had been a half century since architect Stanford White had lechered her, the mercurial Harry K. Thaw of Pittsburgh married her and artist Charles Dana Gibson sketched her as *The Eternal Question*. When the waiter asked her drink order, Evelyn said: "Make mine a Gibson!" Roy nudged me and whispered: "Egad, that's loyalty—and she does it every day!"

Col. Barney Oldfield, USAF (Ret.)
Beverly Hills, California

WRITE TO SMITHSONIAN

Send all letters for consideration in this column to Smithsonian Letters Editor, P.O. Box 44400, Washington, D.C. 20026-4400, or to LettersEd@simag.si.edu. Letters may be edited for clarity and length. Send all other queries and comments to Smithsonian, 900 Jefferson Drive, Washington, D.C. 20560-0406, or see our Website: www.smithsonianmag.si.edu.

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ARICEPT® (Donepezil Hydrochloride Tablets)
Brief Summary—see package insert for full prescribing information. **INDICATIONS AND USAGE** ARICEPT® is indicated for the treatment of mild to moderate dementia of the Alzheimer's type. **CONTRAINDICATIONS** ARICEPT® is contraindicated in patients with known hypersensitivity to donepezil hydrochloride or to piperidine derivatives. **WARNINGS** ***Anesthesia:*** ARICEPT®, as a cholinesterase inhibitor, is likely to exaggerate succinylcholine-type muscle relaxation during anesthesia. ***Cardiovascular Conditions:*** Because of their pharmacological action, cholinesterase inhibitors may have vagotonic effects on heart rate (eg, bradycardia). The potential for this action may be particularly important to patients with "sick sinus syndrome" or other supraventricular cardiac conduction conditions. Syncopal episodes have been reported in association with the use of ARICEPT®. ***Gastrointestinal Conditions:*** Through their primary action, cholinesterase inhibitors may be expected to increase gastric acid secretion due to increased cholinergic activity. Therefore, patients should be monitored closely for symptoms of active or occult gastrointestinal bleeding, especially those at increased risk for developing ulcers, eg, those with a history of ulcer disease or those receiving concurrent nonsteroidal anti-inflammatory drugs (NSAIDS). Clinical studies of ARICEPT® have shown no increase, relative to placebo, in the incidence of either peptic ulcer disease or gastrointestinal bleeding. ARICEPT®, as a predictable consequence of its pharmacological properties, has been shown to produce diarrhea, nausea, and vomiting. These effects, when they occur, appear more frequently with the 10 mg/day dose than with the 5 mg/day dose. In most cases, these effects have been mild and transient, sometimes lasting one to three weeks, and have resolved during continued use of ARICEPT®. ***Genitourinary:*** Although not observed in clinical trials of ARICEPT®, cholinomimetics may cause bladder outflow obstruction. ***Neurological Conditions:*** Seizures: Cholinomimetics are believed to have some potential to cause generalized convulsions. However, seizure activity also may be a manifestation of Alzheimer's Disease. ***Pulmonary Conditions:*** Because of their cholinomimetic actions, cholinesterase inhibitors should be prescribed with care to patients with a history of asthma or obstructive pulmonary disease. **PRECAUTIONS Drug-Drug Interactions** ***Drugs Highly Bound to Plasma Proteins:*** Drug displacement studies have been performed *in vitro* between this highly bound drug (96%) and other drugs such as furosemide, digoxin, and warfarin. ARICEPT® at concentrations of 0.3-10 µg/mL did not affect the binding of furosemide (5 µg/mL), digoxin (2 ng/mL), and warfarin (3 µg/mL) to human albumin. Similarly, the binding of ARICEPT® to human albumin was not affected by furosemide, digoxin and warfarin. ***Effect of ARICEPT® on the Metabolism of Other Drugs:*** No *in vivo* clinical trials have investigated the effect of ARICEPT® on the clearance of drugs metabolized by CYP 3A4 (eg, cisapride, terfenadine) or by CYP 2D6 (eg, imipramine). However, *in vitro* studies show a low rate of binding to these enzymes (mean K_i about 50 -130 µM), that, given the therapeutic plasma concentrations of donepezil (164 nM), indicates little likelihood of interference. Whether ARICEPT® has any potential for enzyme induction is not known. Formal pharmacokinetic studies evaluated the potential of ARICEPT® for interaction with theophylline, cimetidine, warfarin and digoxin. No significant effects on the pharmacokinetics of these drugs were observed. ***Effect of Other Drugs on the Metabolism of ARICEPT®:*** Ketoconazole and quinidine, inhibitors of CYP450, 3A4 and 2D6, respectively, inhibit donepezil metabolism *in vitro*. Whether there is a clinical effect of these inhibitors is not known. Inducers of CYP 2D6 and CYP 3A4 (eg, phenytoin, carbamazepine, dexamethasone, rifampin, and phenobarbital) could increase the rate of elimination of ARICEPT®. Formal pharmacokinetic studies demonstrated that the metabolism of ARICEPT® is not significantly affected by concurrent administration of digoxin or cimetidine. ***Use with Anticholinergics:*** Because of their mechanism of action, cholinesterase inhibitors have the potential to interfere with the activity of anticholinergic medications. ***Use with Cholinomimetics and Other Cholinesterase Inhibitors:*** A synergistic effect may be expected when cholinesterase inhibitors are given concurrently with succinylcholine, similar neuromuscular blocking agents or cholinergic agonists such as bethanechol. **Carcinogenesis, Mutagenesis, Impairment of Fertility** Carcinogenicity studies of donepezil have not been completed. Donepezil was not mutagenic in the Ames reverse mutation assay in bacteria. In the chromosome aberration test in cultures of Chinese hamster lung (CHL) cells, some clastogenic effects were observed. Donepezil was not clastogenic in the *in vivo* mouse micronucleus test. Donepezil had no effect on fertility in rats at doses up to 10 mg/kg/day (approximately 8 times the maximum recommended human dose on a mg/m² basis). **Pregnancy** *Pregnancy Category C:* Teratology studies conducted in pregnant rats at doses up to 16 mg/kg/day (approximately 13 times the maximum recommended human dose on a mg/m² basis) and in pregnant rabbits at doses up to 10 mg/kg/day (approximately 16 times the maximum recommended human dose on a mg/m² basis) did not disclose any evidence for a teratogenic potential of donepezil. However, in a study in which pregnant rats were given up to 10 mg/kg/day (approximately 8 times the maximum recommended human dose on a mg/m² basis) from day 17 of gestation through day 20 postpartum, there was a slight increase in still births and a slight decrease in pup survival through day 4 postpartum at this dose; the next lower dose tested was 3 mg/kg/day. There are no adequate or well-controlled studies in pregnant women. ARICEPT® should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus. **Nursing Mothers** It is not known whether donepezil is excreted in human breast milk. ARICEPT® has no indication for use in nursing mothers. **Pediatric Use** There are no adequate and well-controlled trials to document the safety and efficacy of ARICEPT® in any illness occurring in children. **ADVERSE REACTIONS Adverse Events Leading to Discontinuation** The rates of discontinuation from controlled clinical trials of ARICEPT® due to adverse events for the ARICEPT® 5 mg/day treatment groups were comparable to those of placebo-treatment groups at approximately 5%. The rate of discontinuation of patients who received 7-day escalations from 5 mg/day to 10 mg/day, was higher at 13%. The most common adverse events leading to discontinuation, defined as those occurring in at least 2% of patients and at twice the incidence seen in placebo patients were nausea (1% [5 mg] and 3% [10 mg] vs 1% [placebo]), diarrhea (<1% [5 mg] and 3% [10 mg] vs 0% [placebo]), and vomiting (<1% [5 mg] and 2% [10 mg] vs <1% [placebo]). **Most Frequent Adverse Clinical Events Seen in Association with the Use of ARICEPT®** The most common adverse events, defined as those occurring at a frequency of at least 5% in patients receiving 10 mg/day and twice the placebo rate, are largely predicted by ARICEPT®'s cholinomimetic effects. These include nausea, diarrhea, insomnia, vomiting, muscle cramp, fatigue, and anorexia. These adverse events were often of mild intensity and transient, resolving during continued ARICEPT® treatment without the need for dose modification. There is evidence to suggest that the frequency of these common adverse events may be affected by the rate of titration. An open-label study was conducted with 269 patients who received placebo in the 15- and 30-week studies. These patients were titrated to a dose of 10 mg/day over a 6-week period. The rates of common adverse events were lower than those seen in patients titrated to 10 mg/day over one week in the controlled clinical trials and were comparable to those seen in patients on 5 mg/day. See Table 1 for a comparison of the most common adverse events following one week and six week titration regimens. **Adverse Events Reported in Controlled Trials** The events cited reflect experience gained under closely monitored conditions of clinical trials in a highly selected patient population. In actual clinical practice or in other clinical trials, these frequency estimates may not apply, as the conditions of use, reporting behavior, and the kinds of patients treated may differ. Table 2 lists treatment emergent signs and symptoms that were reported in at least 2% of patients in placebo-controlled trials who received ARICEPT® and for which the rate of occurrence was greater for ARICEPT® assigned than placebo assigned patients. In general, adverse events occurred more frequently in female patients and with advancing age. **Other Adverse Events Observed During Clinical Trials** ARICEPT® has been administered to over 1700 individuals during clinical trials worldwide. Approximately 1200 of these patients have been treated for at least 3 months and more than 1000 patients have been treated for at least 6 months. Controlled and uncontrolled trials in the United States included approximately 900 patients. In regards to the highest dose of 10 mg/day, this population includes 650 patients treated for 3 months, 475 patients treated for 6 months and 116 patients treated for over 1 year. The range of patient exposure is from 1 to 1214 days. Treatment emergent signs and symptoms that occurred during 3 controlled clinical trials and two open-label trials in the United States were recorded as adverse events by the clinical investigators using terminology of their own choosing. To provide an overall estimate of the proportion of individuals having similar types of events, the events were grouped into a smaller number of standardized categories using a modified COSTART dictionary and event frequencies were calculated across all studies. These categories are used in the listing below. The frequencies represent the proportion of 900 patients from these trials who experienced that event while receiving ARICEPT®. All adverse events occurring at least twice are included, except for those already listed in Tables 1 or 2, COSTART terms too general to be informative, or events less likely to be drug caused. Events are classified by body system and listed using the following definitions: *frequent adverse events*—those occurring in at least 1/100 patients; *infrequent adverse events*—those occurring in 1/100 to 1/1000 patients. These adverse events are not necessarily related to ARICEPT® treatment and in most cases were observed at a similar frequency in placebo-treated patients in the controlled studies. No important additional adverse events were seen in studies conducted outside the United States. **Body as a Whole:** *Frequent:* influenza, chest pain, toothache; *Infrequent:* fever, edema face, periorbital edema, hernia hiatal, abscess, cellulitis, chills, generalized coldness, head fullness, listlessness. **Cardiovascular System:** *Frequent:* hypertension, vasodilation, atrial fibrillation, hot flashes, hypotension; *Infrequent:* angina pectoris, postural hypotension, myocardial infarction, AV block (first degree), congestive heart failure, arteritis, bradycardia, peripheral vascular disease, supraventricular tachycardia, deep vein thrombosis. **Digestive System:** *Frequent:* fecal incontinence, gastrointestinal bleeding, bloating, epigastric pain; *Infrequent:* eructation, gingivitis, increased appetite, flatulence, periodontal abscess, cholelithiasis, diverticulitis, drooling, dry mouth, fever sore, gastritis, irritable colon, tongue edema, epigastric distress, gastroenteritis, increased transaminases, hemorrhoids, ileus, increased thirst, jaundice, melena, polydypsia, duodenal ulcer, stomach ulcer. **Endocrine System:** *Infrequent:* diabetes mellitus, goiter. **Hemic and Lymphatic System:** *Infrequent:* anemia, thrombocythemia, thrombocytopenia, eosinophilia, erythrocytopenia. **Metabolic and Nutritional Disorders:** *Frequent:* dehydration; *Infrequent:* gout, hypokalemia, increased creatine kinase, hyperglycemia, weight increase, increased lactate dehydrogenase. **Musculoskeletal System:** *Frequent:* bone fracture; *Infrequent:* muscle weakness, muscle fasciculation. **Nervous System:** *Frequent:* delusions, tremor, irritability, paresthesia, aggression, vertigo, ataxia, increased libido, restlessness, abnormal crying, nervousness, aphasia; *Infrequent:* cerebrovascular accident, intracranial hemorrhage, transient ischemic attack, emotional lability, neuralgia, coldness (localized), muscle spasm, dysphoria, gait abnormality, hypertonia, hypokinesia, neurodermatitis, numbness (localized), paranoia, dysarthria, dysphasia, hostility, decreased libido, melancholia, emotional withdrawal, nystagmus, pacing. **Respiratory System:** *Frequent:* dyspnea, sore throat, bronchitis; *Infrequent:* epistaxis, postnasal drip, pneumonia, hyperventilation, pulmonary congestion, wheezing, hypoxia, pharyngitis, pleurisy, pulmonary collapse, sleep apnea, snoring. **Skin and Appendages:** *Frequent:* pruritus; diaphoresis, urticaria; *Infrequent:* dermatitis, erythema, skin discoloration, hyperkeratosis, alopecia, fungal dermatitis, herpes zoster, hirsutism, skin striae, night sweats, skin ulcer. **Special Senses:** *Frequent:* cataract, eye irritation, vision blurred; *Infrequent:* dry eyes, glaucoma, earache, tinnitus, blepharitis, decreased hearing, retinal hemorrhage, otitis externa, otitis media, bad taste, conjunctival hemorrhage, ear buzzing, motion sickness, spots before eyes. **Urogenital System:** *Frequent:* urinary incontinence, nocturia; *Infrequent:* dysuria, hematuria, urinary urgency, metrorrhagia, cystitis, enuresis, prostate hypertrophy, pyelonephritis, inability to empty bladder, breast fibroadenosis, fibrocystic breast, mastitis, pyuria, renal failure, vaginitis. **Postintroduction Reports** Voluntary reports of adverse events temporally associated with ARICEPT® that have been received since market introduction that are not listed above, and that there is inadequate data to determine the causal relationship with the drug include the following: abdominal pain, agitation, cholecystitis, confusion, convulsions, hallucinations, heart block, hemolytic anemia, hyponatremia, pancreatitis, and rash. **OVERDOSAGE Because strategies for the management of overdose are continually evolving, it is advisable to contact a Poison Control Center to determine the latest recommendations for the management of an overdose of any drug.** As in any case of overdose, general supportive measures should be utilized. Overdosage with cholinesterase inhibitors can result in cholinergic crisis characterized by severe nausea, vomiting, salivation, sweating, bradycardia, hypotension, respiratory depression, collapse and convulsions. Increasing muscle weakness is a possibility and may result in death if respiratory muscles are involved. Tertiary anticholinergics such as atropine may be used as an antidote for ARICEPT® overdosage. Intravenous atropine sulfate titrated to effect is recommended: an initial dose of 1.0 to 2.0 mg IV with subsequent doses based upon clinical response. Atypical responses in blood pressure and heart rate have been reported with other cholinomimetics when co-administered with quaternary anticholinergics such as glycopyrrolate. It is not known whether ARICEPT® and/or its metabolites can be removed by dialysis (hemodialysis, peritoneal dialysis, or hemofiltration). Dose-related signs of toxicity in animals included reduced spontaneous movement, prone position, staggering gait, lacrimation, clonic convulsions, depressed respiration, salivation, miosis, tremors, fasciculation and lower body surface temperature. **DOSAGE AND ADMINISTRATION** The dosages of ARICEPT® shown to be effective in controlled clinical trials are 5 mg and 10 mg administered once per day. Controlled clinical trials indicate that the 10 mg dose, with a one week titration, is likely to be associated with a higher incidence of cholinergic adverse events than the 5 mg dose. Because steady state is not achieved for 15 days and because the incidence of such effects may be influenced by the rate of dose escalation, treatment with a dose of 10 mg should not be contemplated until patients have been on a daily dose of 5 mg for 4 to 6 weeks. Whether or not to employ a dose of 10 mg is a matter of prescriber and patient preference. ARICEPT® should be taken in the evening, just prior to retiring, and may be taken with or without food.

Revised September, 1998

Table 1. Comparison of Rates of Adverse Events in Patients Titrated to 10 mg/day Over 1 and 6 Weeks

	No titration		One-week titration	Six-week titration
Adverse Event	Placebo (n=315)	5 mg/day (n=311)	10 mg/day (n=315)	10 mg/day (n=269)
Nausea	6%	5%	19%	6%
Diarrhea	5%	8%	15%	9%
Insomnia	6%	6%	14%	6%
Fatigue	3%	4%	8%	3%
Vomiting	3%	3%	8%	5%
Muscle Cramps	2%	6%	8%	3%
Anorexia	2%	3%	7%	3%

Table 2. Adverse Events Reported in Controlled Clinical Trials in at Least 2% of Patients Receiving ARICEPT® and at a Higher Frequency Than Placebo-treated Patients

Body System/Adverse Event	Placebo (n=355)	ARICEPT® (n=747)
Percent of Patients With Any Adverse Event	72	74
Body as a Whole		
Headache	9	10
Pain, Various Locations	8	9
Accident	6	7
Fatigue	3	5
Cardiovascular System		
Syncope	1	2
Digestive System		
Nausea	6	11
Diarrhea	5	10
Vomiting	3	5
Anorexia	2	4
Hemic and Lymphatic System		
Ecchymosis	3	4
Metabolic and Nutritional Systems		
Weight Decrease	1	3
Musculoskeletal System		
Muscle Cramps	2	6
Arthritis	1	2
Nervous System		
Insomnia	6	9
Dizziness	6	8
Depression	<1	3
Abnormal Dreams	0	3
Somnolence	<1	2
Urogenital System		
Frequent Urination	1	2

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PHENOMENA

COMMENT & NOTES

We're Scraping Bottom

AS VESSELS AROUND THE WORLD DRAG NETS AND DREDGES ACROSS THE SEABED, THEY SLOWLY DESTROY THE BIOME

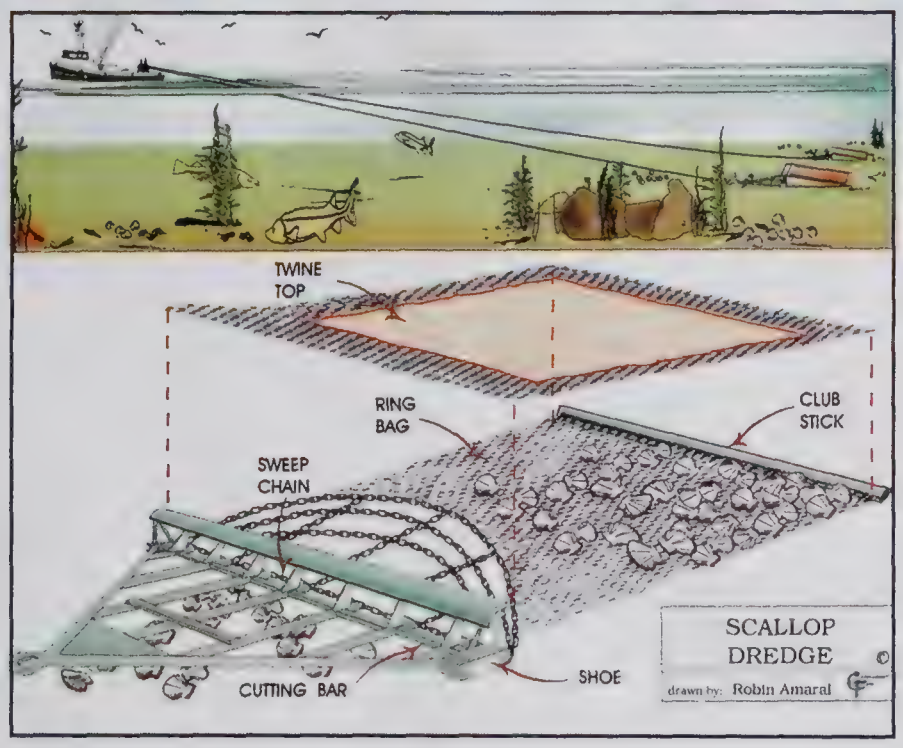
BY JOHN P. WILEY, JR.

Fish jam the narrow, rearmost part of a baglike net before being hoisted out of the water and dumped on the deck of a fishing boat.

BILL CURTSINGER

I WAS BROUGHT UP TO ADMIRE COMMERCIAL FISHERmen, and I still do. The feeling took root during childhood summers in Gloucester, Massachusetts, when that city was still a premier fishing center. I would watch the boats pass Ten Pound Island and then the Eastern Point breakwater as they headed for the open sea, for Browns Bank or Georges Bank. I would watch them returning, and then read in the *Gloucester Daily Times* how many pounds of what kind of fish each boat had brought in. One of the high points of my early childhood was riding a boat from Gloucester to Boston and back, for ice. I can still remember sitting at lunch when the single-cylinder diesel engine missed just one beat. Every man at the table was on his feet before the engine resumed its steady *chuff chuff chuff*. Everyone sat down again and picked up the conversation where they had left off.

Some of the outbound traffic I watched towed boats in which nets called purse seines were stored. Their crews would use the boats to deploy the nets in circles around schools of mackerel and then pull in a line on the bottom of the net so it closed. Others were swordfishermen, their harpoons lashed to the bowsprit. Still others carried steel-



Top: Pictures of the seabed at the Georges Bank fishing grounds compare an undisturbed area (left) with one over which fishing gear has been towed. Above: A sketch shows how a scallop dredge works.

framed dredges with chain bags to gather scallops. But most were what in the Northeast were called draggers: they would drag great bags of net across the bottom, then haul them up and dump the catch on deck (SMITHSONIAN, May 1985). The bags are held open by floats fastened along the top, weights on the bottom and angled boards at the sides. The boards are called otter boards, and the whole rig is an otter trawl, the most widely used towed bottom-fishing gear.

These fishers are, on an industrial scale, the last hunters of wild things, men and women who go to sea to catch the finfish and shellfish the rest of us love. This is not weekend sailing on the bay. It is working on the open ocean in winter as well as summer, sometimes in weather that would keep "sensible" people indoors, not to mention off the water. It is using axes to chop frozen spray from wheelhouse and mast before the boat becomes top-heavy and rolls under. Later in life I bored my long-suffering children by pointing out to them the high bows and heavy construction of commercial fishing boats compared with the pleasure boats tied up in the same harbors. It's the difference between the Western and Eastern ways of riding horses, as explained to me once by a wrangler at a dude ranch. "Out here," he said, "we ride horses to get somewhere." Fishing boats are serious.

My admiration for commercial fishermen has not diminished by the proverbial iota. (In fact, I go through cycles of buying a monthly publication called the *National Fisherman,* written for them.) But I'm finally having to face a terrible truth, one a child could have figured out but that somehow does not seem possible in the vastness of ocean from one horizon to the next. Dragging those nets across the bottom, year after year and decade after decade, wrecks the bottom. Reality has come to face me. A couple of years ago I chanced to see on television a film of an otter trawl moving across the bottom in the clear water of the Sea of Cortez. It seemed to be having the effect a line of tanks would have had. And now scientists have quantified the damage done by dragging nets across the bottom. Think of it as clear-cutting.

The December 1998 issue of *Conservation Biology* carries seven reports on what fishing does to the bottom. The lower part of the net opening moves across the bottom like a road grader, skimming off the top few inches of mud or sand and most of the invertebrates that live there, the worms and amphipods and anemones that biologists know as the benthic community. The net crushes or buries some of the organisms. Others are suddenly exposed to predators as the net sweeps away their hiding places, the complex structures created by organisms such as soft corals, brachiopods, bryozoans and crinoids. Some

... AND DANN BLACKWOOD/U.S. GEOLOGICAL SURVEY(2); ROBIN AMARAL

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benthic creatures live a long time (Atlantic quahog clams live for up to 200 years, and some deepwater corals live more than 500 years) and grow and reproduce slowly; recovery from a trawler pass can take years.

Humans aren't the only ones disturbing the seabed. Feeding whales and walruses leave what look like bomb craters in the sediment. We humans do operate on a grand scale, however. Les Watling, of the Darling Marine Center at the University of Maine, and Elliott A. Norse, of the Marine Conservation Biology Institute, in Redmond, Washington, calculate that mobile fishing gear covers an area equal to all the continents' shelves, 10.8 million square miles, every two to four years. The United Nations estimates that about 39,000 square miles of forest is cut every year. Thus the damage to the seabed occurs over an area 150 times as great. Until very recently, few people took much notice. Perhaps it's because "the oceans, unlike forests, still look like the oceans after we've removed their contents," suggests James T. Carlton, of Williams College-Mystic Seaport, in Connecticut, in an accompanying editorial. On a deeper level, he proposes that while we have a pretty fair idea of what we've done to the terrestrial landscape and its biodiversity, we know very little of our impact on the oceans—outside the obvious cases of declining fisheries. He adds that even as long as 100 years ago life in the oceans was already profoundly affected. Carlton asks: "Where is the large, beautiful hydroid *Ectopleura americana*, first and last collected on a ship's hull in 1879 in Long Island Sound? . . . Which species were carried around the world by ships for 300 years prior to 1800 that we pretend are now native everywhere they occur?"

At the end of a successful tow in the Bering Sea, a net comes up filled with Alaskan pollock, a resource once thought inexhaustible.

We don't know anywhere near as much as we'd like to about the world's oceans and the state of their biodiversity, but we do know there are fisheries in decline all over the world. Many of those declines have been blamed on overfishing, but now we are learning why the stocks don't always rebound even when moratoriums are enacted. The marine equivalent of clear-cutting leaves little or nothing for remnant populations, juveniles and their prey to live on and no place to hide.

In the Northeastern United States, and in the Gulf of Mexico and the Pacific Northwest, fishermen are suffering. Boats are tied up. Ancillary businesses are going under. In Canada, where 30,000 fishermen are no longer allowed to fish, communities are dying. Governments are doing what they can. In New England the federal government is trying to open markets for previously unsalable fish, such as skates, sculpins and dogfish. But some conservationists in turn are horrified that more species are being targeted. "People who would be outraged to find blue herons [p. 130] or raccoons in the meat section at the supermarket are willing to accept the hunting and marketing of previously unexploited species of marine life," wrote Tatiana Brailovskaya, of the Nereus Project, in Newcastle, Maine, in *Conservation Biology*.

If you drive up from Boston and then cross the Annisquam River into Gloucester, you will pass a memorial to the more than 7,000 men lost at sea from 1623 to 1923. Once, fishing was everything. Now modern-day Gloucester, the city of Sebastian Junger's current best-seller, *The Perfect Storm*, continues its decline as a fishing port. We've come perilously close to licking the platter clean. Large parts of the fishing grounds are closed, certain species are off-limits. Some species may recover. I just hope I never see the day when the last Gloucester fishing boat has passed the breakwater coming home from the sea and there will be no more.

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Moving Down the Line

IT'S PULLED AND JIMMIED, TIED AND LIFTED—BUT THE 20-TON *JUPITER* ENGINE FINALLY REACHES ITS NEW HOME

BY MICHAEL KERNAN

EVERYTHING GOES SO SLOWLY. WE ARE MOVING THE *Jupiter* locomotive and its tender—25 tons of antique iron—from the Arts and Industries Building (A&I) across the Mall to the National Museum of American History's Railroad Hall.

Jeff Grooms of Hutchinson/United Rigging and his crew have been here since 7 A.M. Actually they began Thursday, working out the final details of the transfer and helping remove miscellaneous parts from the *Jupiter*. (The smaller *Pioneer* and *Olomana* locomotives, which had been housed in the Railroad Hall, have been moved to make way.) On Friday, they carefully lifted and rolled *Jupiter* and its tender as close to A&I's doors as possible, in preparation for hoisting onto truck trailers. Now it's day three—Saturday.

They have lifted the huge engine by securing a sling around the front, placing a steel bar between the back wheels, and suspending the sling and bar from two horizontal I-beams. The I-beams are held aloft on four enormous hydraulic gantries, and the gantries rest on what appear to be heavy, radio-controlled scooters.

Everyone stands around talking in low tones. The black, white and crimson squares of the museum floor are awash in yellow electric cables as thick as your thumb. Outside in the parking lot the tender, removed earlier today, waits on a truck. Another long flatbed has been backed partway through the (luckily) enormous doors of the museum.

The problem is that the I-beams are a couple of inches too long to fit through the doors. So they are going to slide the locomotive onto the back of the flatbed while it's still indoors. The monster would have gone through the doors easily by itself, but will it fit while on top of the flatbed?

People consult quietly. Ray Hutt, Peter Liebhold and Steve Lubar of the American History staff join in. The riggers, big men, big all over, in straining T-shirts, their hard hats on backward, look to the transportation curator, Bill Withuhn. Withuhn, 6 feet 4 and solid, looks to the project manager. The project manager looks up at him. She is Susan Tolbert, 5 feet 4 and 105 pounds. She wears her hard hat straight on, with her chestnut hair flowing down behind. A museum specialist in the history of technology, she has been a project manager for four years. "Most of the job is coordinating things," she says.

Finally, the riggers and museum experts all agree to try it. No time to send for a special low-bed trailer. Slowly the gantry motors roll the great machine forward. Every few inches the gantries' little wheels catch on the wood planks and aluminum plates that were put down to protect the marble floor, and they have to be jimmied along.

The 1876 *Jupiter* locomotive, accompanied by a museum curator, travels atop a flatbed to its new showcase in the National Museum of American History in Washington, D.C.

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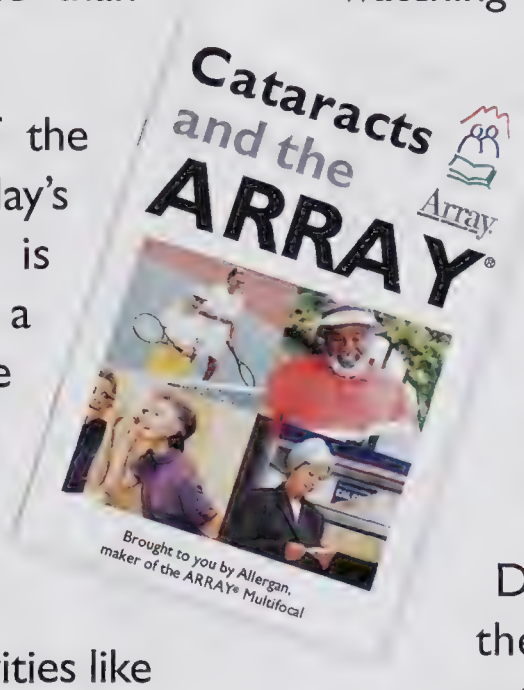

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1. A very small percentage of patients (less than 1% in the US Clinical Study) have been dissatisfied to the point of requesting removal of the multifocal lens.
2. In a driving simulation study, under one of nine low contrast conditions, 22% more multifocal patients than monofocal patients did not notice a hard-to-see object in the road until they were closer than 100 feet. The distance of 100 feet is important because at speeds of 30 mph or faster, a driver may not be able to stop safely within 100 feet. In the simulation, however, drivers could also drive around objects, and there was no difference in collisions with the objects.

Precautions

1. There is a chance (11%) that your vision may not be good enough to read small print without glasses with the multifocal IOL.
2. Please discuss with your physician whether this is the right lens for you. The following may affect your choice of IOL:
   — In rare instances, this lens may make some types of retinal surgery more difficult.
   — If the pupil of your eye is very small (less than 2.5 mm), the chances are greater that your near vision with a multifocal lens will not be better than with a monofocal lens.
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	Monofocal IOL	ARRAY® Multifocal IOL
DISTANCE VISION	This IOL generally gives good distance vision.	This IOL generally gives good distance vision, but it may not be quite as sharp as with a monofocal IOL.
INTERMEDIATE VISION (between 2 and 5 feet)	Intermediate vision is expected to be comparable between these two types of IOLs.	
NEAR VISION	This IOL generally does not provide good near vision without glasses.	Most patients can expect near vision to be better than with a monofocal IOL, but there may still be some circumstances where you will need glasses for near work.
USE OF GLASSES	If you have this lens in both eyes, there is a 60% chance you will always wear your glasses for near work. There is a 34% chance you will wear your glasses all of the time (for any distance).	If you have this lens in both eyes, there is a 12% chance you will always wear your glasses for near work. There is an 8% chance you will wear your glasses all of the time (for any distance).
HALOS AND GLARE	With this IOL, there is a chance that you may have severe difficulty with halos around lights (6%) or with glare (1%).	With this IOL the chances of having severe difficulty with halos (15%) and glare (11%) are higher when compared to a monofocal IOL. You may grow accustomed to them or continue to notice them. In rare instances (less than 1%), patients have requested that the IOL be removed.
LOW CONTRAST VISION (DRIVING)	Under poor visibility conditions, your vision may not be as sharp as in good light.	Under poor visibility conditions, your vision may be further reduced than it would be with a monofocal IOL. Under these conditions you may have more difficulty recognizing some traffic signs and hard-to-see objects in the road. Therefore, you may need to take extra care when driving, especially in poor light conditions.

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After about an hour the *Jupiter* hangs directly above the flatbed. It is lowered gingerly. But before it touches the truck someone notes that the locomotive's wheel flanges shouldn't carry the whole weight. So boards are slipped partway under the wheels, simulating a track and spreading the burden.

As the *Jupiter*—a mere 20 1/2 tons without the tender—ever so gradually settles down, the flatbed sags. It sags right onto the tires and the tires sag, too. But nothing pops.

Now the *Jupiter* is winched by hand with a grip hoist, one inch at a time, to bring it more squarely onto the flatbed. "I could have used the winch from the truck," mutters Grooms, "but I didn't want to smoke up the building." Giant locomotive wheels turn without a squeak. Withuhn says he has sprayed two whole cans of WD-40 on the moving parts, for the *Jupiter* hasn't stirred since arriving at A&I in 1976.

The men offer Tolbert a pull at the winch jack. She gets up on the truck and gives a mighty haul. It almost throws

He has sprayed two cans of WD-40 on the moving parts, for the Jupiter hasn't stirred since 1976.

her; she has to put everything she's got into it—but it moves. She gets a laugh and applause.

Grooms climbs aboard the *Jupiter*, whose old-fashioned stack has been removed, and eyeballs the route through the big doors. He indicates with his fingers: four inches to spare. "Take it out!" he calls. And the truck labors forward, slowly hauling the locomotive out into the parking lot. The top clears the door by exactly four inches. (I remark that the truck bed has sagged four inches, too, but I am assured that they anticipated that.) Everyone claps. It's lunchtime.

The *Jupiter*, built in 1876 in Philadelphia, first worked for the Santa Cruz Railroad Company, in California, linking Santa Cruz and Monterey Bay with the Watsonville artichoke farms. As an economy measure it was designed for narrow-gauge rails, 36 inches apart instead of the standard 56 1/2. It burned wood.

Withuhn explains that the wheel arrangement, four main driving wheels with four smaller ones in front, is an American innovation. The earliest locomotives in England had just the four main wheels, and that was fine for the wonderfully level and even tracks common on English railroads. But on the roughly built American tracks, covering hundreds of miles and ranging over all sorts of wild country, a four-wheeler tended to careen off the tracks. Hence the front-runner pilot wheels to help guide it

around curves and over bumps. This American invention was soon copied by the British and other Europeans as their own rail systems expanded.

In 1881 the Southern Pacific Railroad took over the little line and converted it to standard gauge. The *Jupiter* was sold to Guatemala in 1885. It worked in the jungles for decades, soon losing its gold filigree striping, brass trim and beautiful walnut cab. Retired, the locomotive was bought in 1963 by O. Roy Chalk, Washington's flamboyant transit czar, and installed in a playground at 7th and O streets, Northwest.

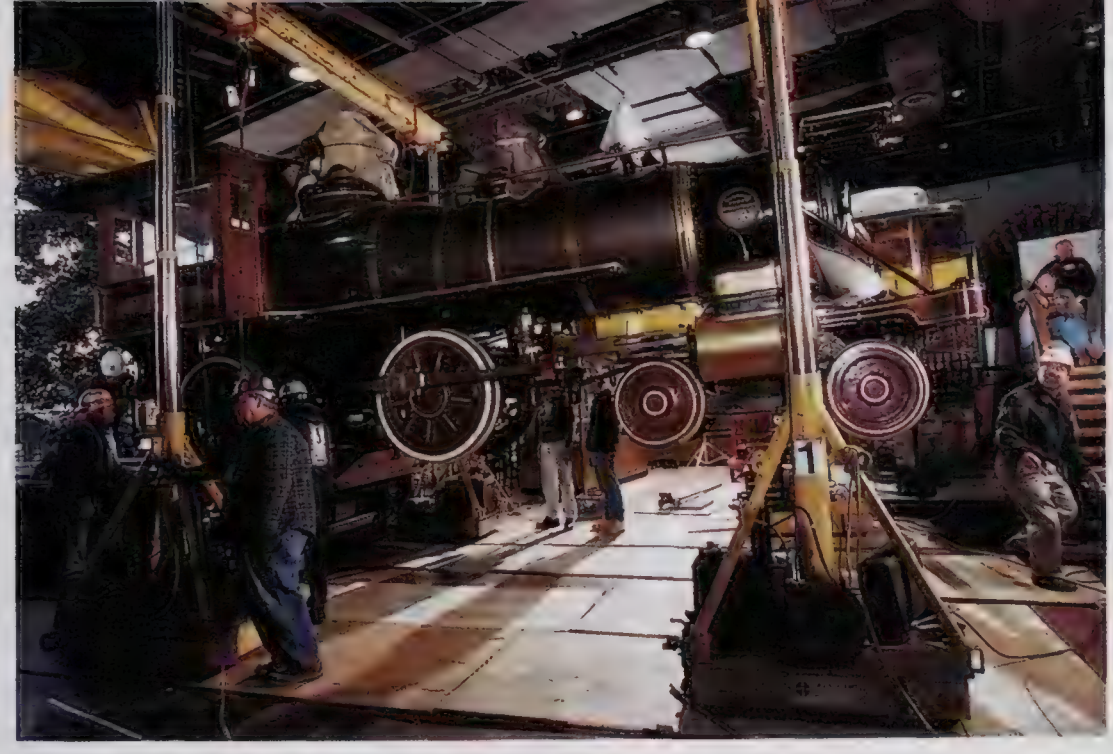
When America's bicentennial came up, Chalk, noting the date 1876 on the locomotive's flank, gave the *Jupiter* to the Smithsonian. Using an 1880 photograph and the original specifications, the people at the Smithsonian's preservation and storage facility, located in Silver Hill, Maryland, restored the trim and wooden cab so it looked like new.

As for the locomotives it replaces in the Railroad Hall, the *Pioneer*, 12½ tons and built in 1851, goes to the National Museum of Industrial History at Bethlehem, Pennsylvania. The 116-year-old *Olomana* will come to A&I next month to be part of an exhibition on the Japanese experience in Hawaii—although it, too, eventually moves on to Bethlehem.

There is a good reason for its inclusion in the exhibition. Built in Philadelphia, the *Olomana* was shipped around the Horn to Oahu in 1883 to work on a sugar plantation that was manned by large numbers of Japanese immigrants. Its narrow gauge and light weight of nine tons enabled it to run on temporary tracks in the cane fields at five miles per hour, though it sometimes was allowed to race on the main tracks at 20 mph. It wound up in Hollywood on animator Ward Kimball's private backyard railroad. Walt Disney himself ran it along the little track.

Well, we're back from lunch and now the real work begins. The locomotive and tender have been trucked down 14th Street to Constitution Avenue (stopping en route for photographs of the startling sight rolling through traffic with the Washington Monument in the background) and across the lawn to the Railroad Hall of American History, whose vast glass doors will accommodate any locomotive you could mention. The more modern 1401 steam locomotive, 280.8 tons in working order

It is pushed by back
and leg power over to the track.
It still must be turned 90 degrees.



Hydraulic gantries like the two shown in the foreground support the 20-ton engine on horizontal beams as the *Jupiter* is deposited safely inside the Railroad Hall.

JEFF TINSLEY, SI

and 92 feet long, is already in the hall and I don't even want to think about how that got there.

At this late date I learn that one of the plans originally suggested had been to simply trundle the *Jupiter* over to American History on its own wheels. It would have been a terrific spectacle, but there were too many potential hazards.

Laboriously, the tender is hoisted in first, gently lifted down off the truck on its slings. There are problems, however. For one thing, it has to be turned 90 degrees to go onto the track that was brought over from A&I. The other problem is that the lifting gantries don't turn.

So—after more quiet consultation—the tender is set down on four aluminum skate dollies. Then it is pushed by back and leg power over to the track. It still must be turned 90 degrees.

This procedure is so painstaking that most of the spectators who have been hanging around all day take a walk. The tender, which is lifted using two slings but no bar, is turned five or six degrees by hand and lowered onto the floor. Then the gantries are shifted, the slings tightened up again and the tender turned another five degrees. And set down again.

Co-foremen Jeff Grooms and Robert Jackson never seem to lose their concentration. Grooms, who lives in Fredericksburg, Virginia, has been a rigger for 21 years, "since I was 19," and has some spectacular credits.

When Hutchinson/United Rigging removed the 20-foot bronze Statue of Freedom from the Capitol dome, Grooms worked for two weeks on the job, and helped attach

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the lifting cable himself. "Then the helicopter came in and took it away and got all the credit," Grooms informs me good-naturedly.

It was Grooms and his crew who recently took down the enormous Star-Spangled Banner for conservation work, and who inspected the huge scaffolding erected for the current repairs to the Washington Monument.

"There are a lot of ways to do things," he tells me, and indeed he has a wonderful repertoire of powerful tools, machines that can lift, say, the 20-ton bridge cable sample at American History yet can be controlled with a push-button hand switch. "But you have to be watching every second. You can't make even the first mistake."

I kept remembering that locomotive dangling over the truck bed, moving so slowly. Anything that heavy—once it starts to move, look out. You can't just stick your hand up and stop it.

"What gets me," says Bill Withuhn (SMITHSONIAN, *Around the Mall*, December 1998), an old railroad hand familiar with these massive machines and their majestic recalcitrance, "is the patience that the riggers have. The amazing patience."

He is right. I left the scene late Saturday, and though the

Once it starts to move, look out. You can't just stick your hand up and stop it.

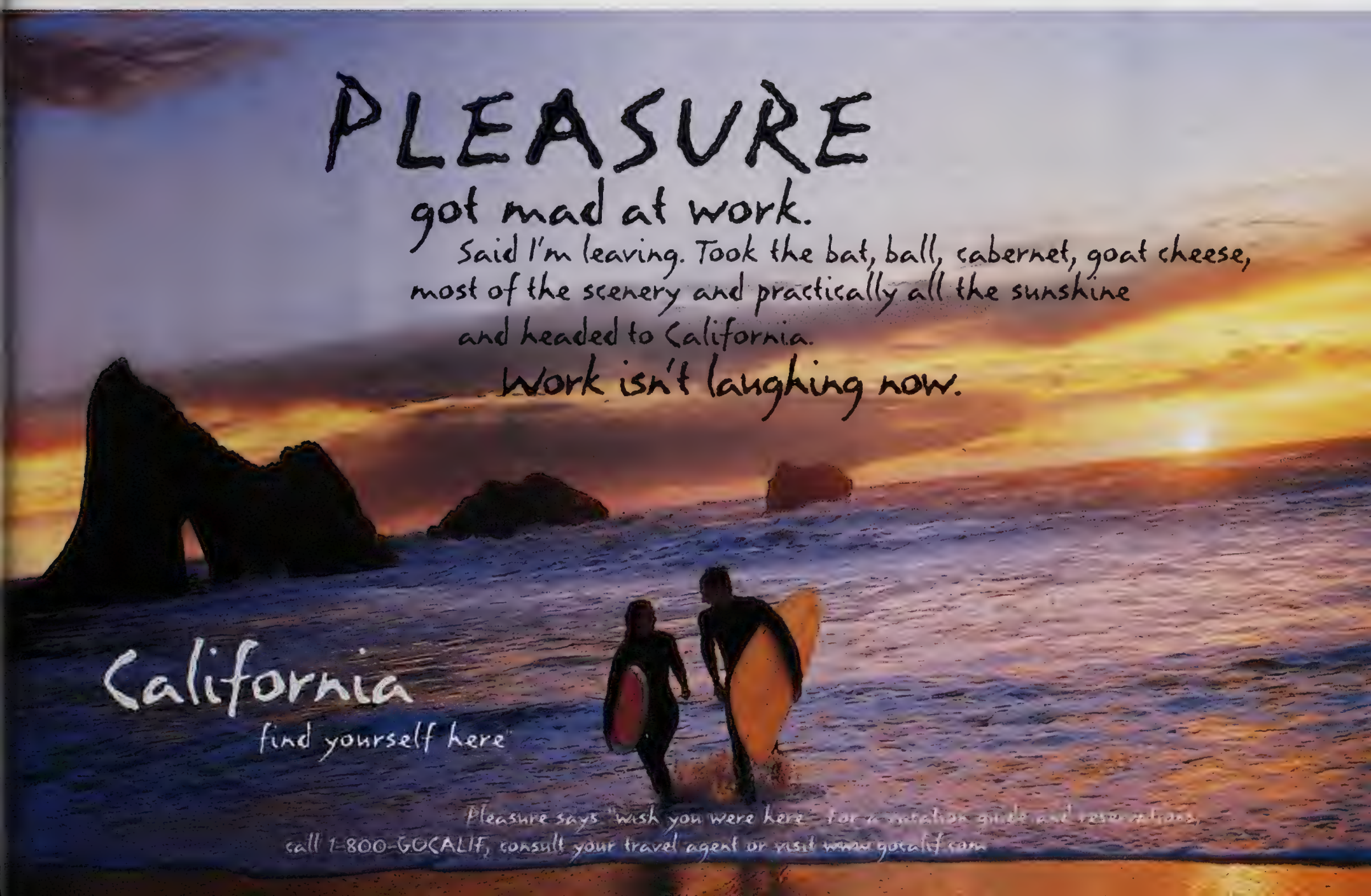
short section of track had been laid down exactly on Susan Tolbert's taped guidelines, the tender still wasn't in place. And the locomotive waited outside on the lawn until it could be moved inside to protect it from the weather.

The crew got the tender set, then worked all day Sunday to position the *Jupiter* in the hall correctly, turning it bit by bit, lifting and setting it down, over and over.

When—on Monday!—the whole apparatus was at last sited, the cowcatcher and stack reattached, and the gear cleared away for a celebratory picture, it was Smithsonian photographer Jeff Tinsley who noticed that the stack was on crooked.

Apparently, it had been slightly crooked all these years. The museum's staff and the riggers, who by now must have been a little sick of the *Jupiter* and its ways, rebolted the stack aright.

Grooms shrugged. "This is nothing," he said. "We do a lot heavier stuff than this. Industrial stuff with overhead cranes. We had one piece that weighed 75 tons . . . " But that's a different story.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THE OBJECT

AT HAND

Tasty Brazil Nuts Stun Harvesters and Scientists

A SMITHSONIAN BIOLOGIST TRACKS THE PROTEIN-RICH NUTS TO UNDERSTAND THEIR ROLE IN THE AMAZONIAN FOREST

BY DAVID TAYLOR

A SINGLE POD OF BRAZIL NUTS can just about fit in a man's hand. But whenever a good-sized pod, like the ones in the National Museum of Natural History's South American exhibition, tumbles from its perch some eight stories above the forest floor, people take notice. "You sometimes see animals staggering around with large welts" where they've been struck, says Enrique Ortiz, a biologist at NMNH who has been studying Brazil nuts in Peru for more than eight years. The four- to six-pound pods hit the ground with a force that can—and does—kill a man. At times they literally plant themselves on impact.

A falling harvest is just one of the mortal dangers braved by *castañeros,* as people who live by collecting the nuts are known in Spanish-speaking South America. The nuts themselves are known as *castañas* (or *castanhas* in Brazil). Trying to gather Brazil nuts on a regular basis puts the castañeros in contact with vipers and jaguars, diseases like malaria and leishmaniasis, tyrannical bosses and traders, not to mention death from drowning and armed skirmishes over the possession of trees.

Brazil nuts add some $44 million annually to South American economies. Americans gobble up nearly $17 million of the nuts a year. Alone among the foods in the world economy, these nuts come almost exclusively from remote natural forests rather than more convenient plantations.

Ortiz and his colleague Adrian Forsyth describe their research goal as "getting Brazil nut forests protected based on the ecologic, economic and social viability" of collecting Brazil nuts from natural forests. They think they may be able to show that, danger of serious or fatal injury aside, castañeros can make a better living gathering nuts from a living forest year after year than from any one-shot timber harvest.

Ortiz and his team have gone to elaborate lengths with these goals in mind. Their research site is the Madre de Dios region of Peru in the Amazon's lush, upland rain forests where Peru, Brazil and Bolivia meet. This is one of the most productive areas of Brazil nut country. From Lima, it's a one-hour plane ride plus seven hours by boat. In Madre de Dios, Ortiz and a team of eight researchers keep 1,000 or so trees under surveillance, counting every pod that falls and locating the most productive areas so that castañeros can gather the nuts more efficiently. Each pod holds 10 to 25 Brazil nuts, which are technically seeds, arranged inside a pod like sections inside an orange.

Brazil nut trees flower at the start of the rainy season; each flower lasts just one day. Blossoms that open before dawn one morning fall by late afternoon. Gradually the forest floor becomes strewn with the cream-colored, marble-to-golf-ball-size flowers, which attract brocket deer and large nocturnal rodents called pacas. The mature pods fall in the rainy season.

One of a stack of Brazil nut pods (top) from the National Museum of Natural History shows signs of gnawing by a rodent called an agouti (above), here eating nuts in a pod.

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40	$ 148	$ 183	$ 185	$ 263	$ 273
45	$ 200	$ 210	$ 265	$ 360	$ 393
50	$ 260	$ 305	$ 375	$ 535	$ 590
55	$ 380	$ 428	$ 578	$ 1,018	$ 1,065
60	$ 528	$ 675	$ 865	$ 3,140	$ 3,140
65	$ 838	$ 993	$1,633	$ 4,100	$ 4,100
70	$1,400	$ 1,637	$3,283	$ 5,270	$ 7,220
75	$2,797	$ 4,770	$6,560	$10,370	$10,370

Male Premiums

Age	10 YEAR	15 YEAR	20 YEAR	25 YEAR	30 YEAR
35	$ 138	$ 153	$ 178	$ 245	$ 273
40	$ 161	$ 199	$ 243	$ 345	$ 360
45	$ 240	$ 315	$ 375	$ 500	$ 523
50	$ 358	$ 483	$ 558	$ 798	$ 838
55	$ 535	$ 720	$ 848	$ 1,640	$ 2,810
60	$ 860	$ 1,070	$1,353	$ 4,100	$ 4,100
65	$1,453	$ 1,813	$2,850	$ 5,270	$ 5,270
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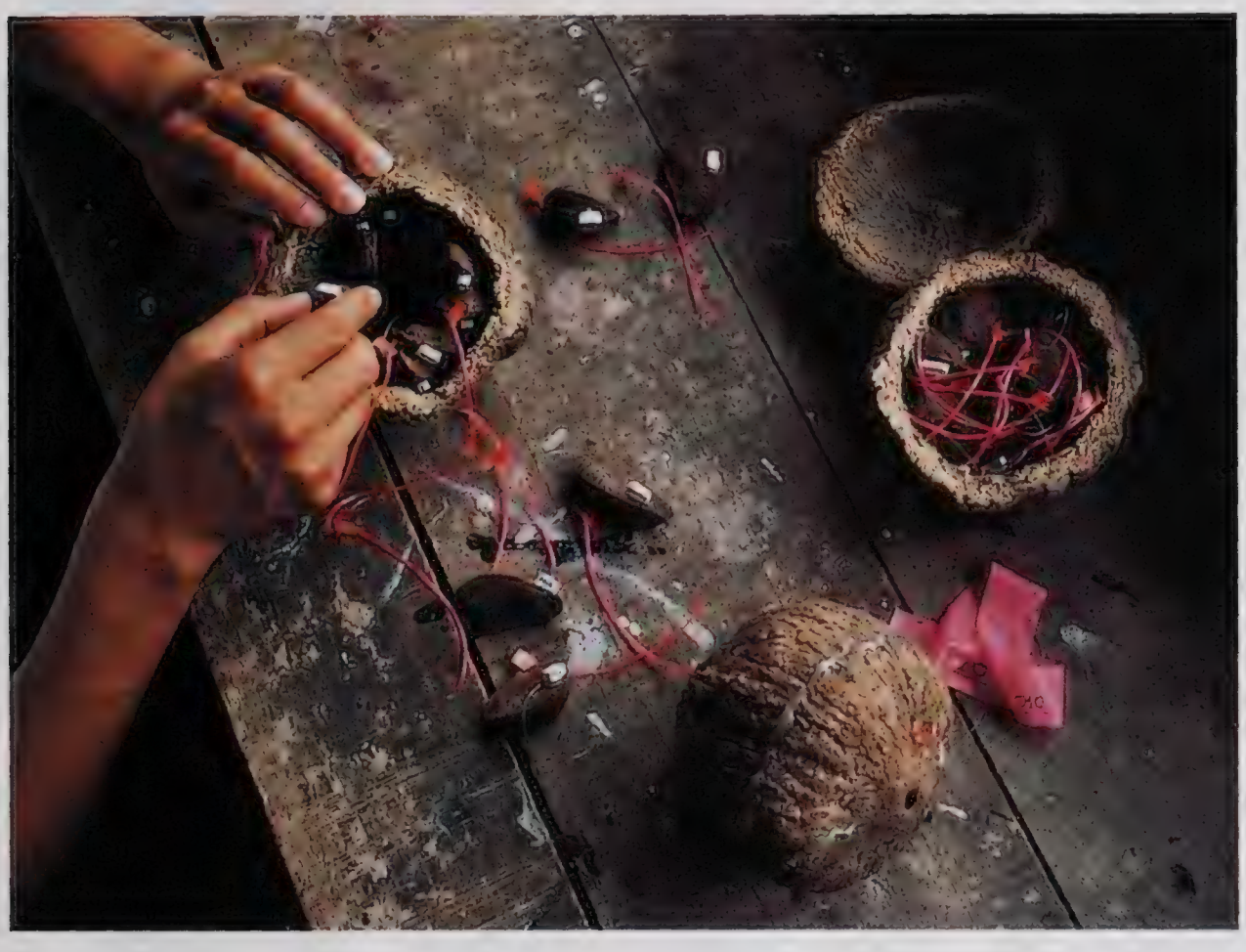
Castañeros have to time things just right. If they come too early they waste valuable time waiting for the pods to fall. Too late and they'll lose the harvest to agoutis, cat-size brown rodents that gather up all the Brazil nut pods they can find and then bury the nuts individually, just as squirrels bury acorns for future food.

The agouti turns out to be a major player in the history of the Brazil nut. By burying the Brazil nuts, agoutis hold the key to the tree's survival in remote areas. The agouti is virtually the only animal that has teeth strong enough to open the thick husk and liberate the seeds so they can sprout. Ortiz was the first to fully understand the agouti's crucial role. To learn how many pods each agouti collected and how far it carried them, Ortiz and his team carefully opened pods that fell from 12 trees in Madre de Dios, painstakingly glued a tiny magnetic strip and a number to each seed, then glued all 120 pods back together like Russian egg puzzles.



To track Brazil nuts, a biologist cuts open a pod, numbers and magnetically tags the nuts within, then glues the husk back together and replaces the pod on the forest floor.

The agoutis were completely taken in and busily began eating, or burying the doctored nuts. Ortiz's team later spent more than six months searching the forest with a magnetic locator and waiting for the seeds to sprout, a cycle that takes up to a year. Their patience is yielding a precise picture of how the Brazil nut population replenishes itself and what conditions are most favorable to its regeneration. Further research may reveal other ways in which the castañeros' harvesting could be more efficient and profitable. At present, more than 30 percent of harvested nuts spoil before they get to market.

For centuries the trees have been acquiring more and more human travel agents, those local people who found the nuts and pods useful. Many tribes, like the Yanomami, ate the nuts raw, grated and mixed into a manioc porridge. (The nuts also contain varying levels of selenium—perhaps 250 times more than most foods—depending on the soil where they're grown. Selenium may deter ovarian cancer by helping activate a powerful antioxidant, but too much can be toxic and cause balding.) Today the nuts are dried and graded, and some are shelled, before being packed in vacuum-sealed bags for shipment. They are eaten raw as well as roasted and salted. Brazil nuts contain about 14 percent protein, 11 percent carbohydrates, and 67 percent fat or oil, as well as potassium, phosphorus, calcium and Vitamin B.

People consume the Brazil nut not just as a protein-rich food, but in a special tea for stomachaches and ultimately as an ingredient in Ben & Jerry's Wavy Gravy ice cream. Its oil has been used for cooking, and in lamps and soaps and, more recently, hair conditioners. The husk can be burned for fuel, set smoking to repel mosquitoes and blackflies, or carved into ashtrays and trinket cases.

At the end of the 15th century, unbeknownst to the Amazonians, Spain and Portugal divided up South America. The Portuguese got Brazil and started sending back tantalizing samples of the New World in ships laden with gold and jaguars. Meanwhile, the Spanish infiltrated from the west coast. On a reconnaissance mission in 1569, Spanish officer Juan Alvarez Maldonado and his exhausted troops flopped down to rest in the middle of some Brazil nut groves near the Madre de Dios River. The Cayanpuxes Indians told Maldonado about the nuts, and he ordered that thousands be collected for rations. The Spanish called them *almendras de los Andes*—"almonds of the Andes."

But it wasn't until 1633, when the trade-savvy Dutch sent some of the nuts home, that Brazil nuts gained a truly world market. The German botanist-explorer Alexander von Humboldt and French colleague Aimé Bonpland ventured to South America in 1799. During a five-year expedition, they collected 60,000 plants, as well as other specimens, and data on wildlife, climate and geology.

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[1] *Management Accounting* (USA), February 1994.
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Humboldt was the first European to observe how the poison curare was made. He scrambled most of the way up the Andean volcano Chimborazo, more than 20,000 feet tall, setting a world altitude record that stood for 30 years. On their return to Paris, they were treated like homecoming astronauts. It was they who named the Brazil nut tree *Bertholletia excelsa,* after Humboldt's friend the chemist and salon host Claude Louis Berthollet.

By the second half of the 19th century, the celebration of Christmas in England had snowballed into a lavish affair, and the holiday brought bowlfuls of the raw, bitter-tasting nuts to households throughout the country. "I'm Charley's aunt from Brazil—where the nuts come from," was a boffo line in various versions of the farce *Charley's Aunt*, which opened in London in 1892 and had many lives, including a movie with Jack Benny.

Along the way a remarkable thing happened. Brazil nuts got hooked up with that other Amazonian wonder, rubber, in a symbiotic relationship.

The enormous demand for rubber that started in the mid-19th century brought waves of settlers from the coast into the forest, where they tapped the gooey white latex from May to November. Many collected raw rubber in Brazil nut husks. In the rainy winter, Brazil nut harvesting kept them working in the forest from December to March. When the rubber market soared, Brazil nut sales followed. From 1847 to 1897, rubber exports grew by more than 2,000 percent. But in the 1870s colonists in Southeast Asia found they could grow Brazilian rubber trees free from the parasites prevalent in South America. From 1910 on, Brazilians watched rubber's price plummet. Those stranded in the forest with no sure income turned to the Brazil nut.

Today's castañeros live a lot like they did a hundred years ago. They make huts in the forest and wait for the nuts to fall. Most collecting is done in the morning, when the wind is still and there's less chance of being beaned by a falling pod. On a good day, an experienced collector can find upwards of a thousand pods, chop them open with a machete and haul the nuts, in sacks of up to 140 pounds, to the nearest river or road.

The Brazilian port of Belém still exports about half the world's Brazil nuts, but the supply pyramid is steep: many thousands of collectors feed only a few exporters; several of Brazil's largest export firms are held by one family. In the backcountry the nuts remain a kind of currency, and occasionally violence erupts. In Macapa, Brazil, in 1985, six collectors were killed and 12 wounded in a fight over Brazil nuts. Dealers cruise the waterways in boats loaded with food and manufactured goods, looking to barter for nuts. Castañeros squirrel away Brazil nuts as insurance against emergencies. Ortiz tells of one family crisis when a collector had to rush his son, who was running a high fever, to a clinic. With no money on hand, the man threw several sacks of shelled nuts into the canoe. At the village, he quickly sold the nuts and bought the boy's medicine.

With the aid of a tumpline to balance his up-to-140-pound load, a nut gatherer carries a bag of Brazil nuts to a nearby river or road, where they will be taken on to market.

There have been changes. Parts of the Amazonian forests have given way to dams, cattle ranching and slash-and-burn farming. Last year fires consumed thousands of square miles of forest. Ortiz and Forsyth know it won't be biology alone that makes the Brazil nut business healthier for the castañeros and the trees. A sharp drop in the market price can transform some castañeros into chainsaw-wielding outlaws.

Though felling Brazil nut trees is illegal, a black market exists for the trees' durable wood. But understanding biology can help. "Think about the connections," says Ortiz. "Bees pollinate and affect fruit production, which determines the harvest size, and ultimately this justifies land-use policies, which determine the forest's fate." Likewise, "changes in the agouti population may affect seed losses, regeneration of the trees, forest health and collectors' incomes," says Ortiz. "This needs to be known." The agoutis aren't talking, however. One stands poised in the NMNH display, just a few feet from the Brazil nuts, forever awaiting its snack.

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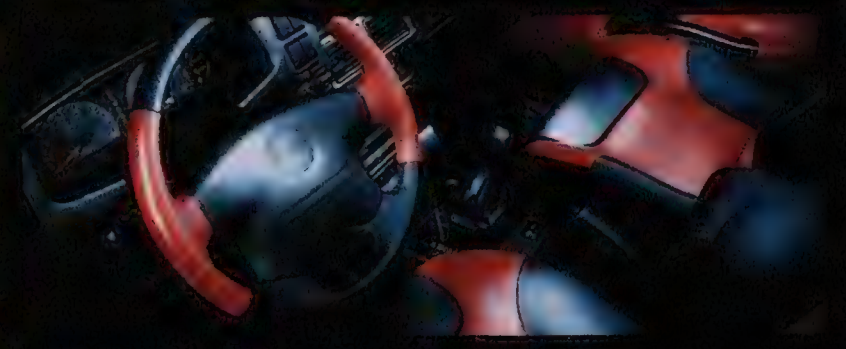

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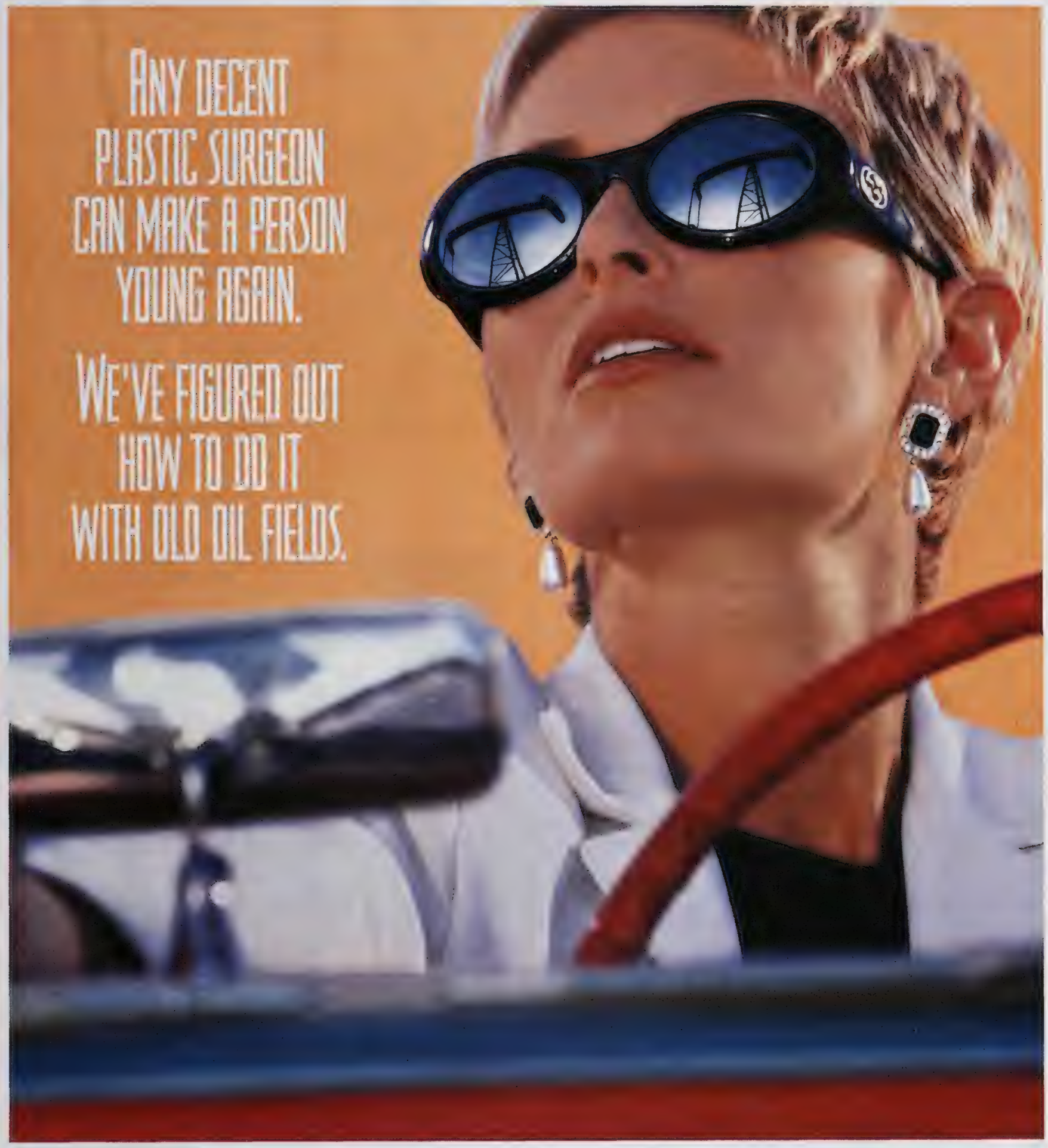
American Crafts—A Perfect 10

"THE NATION'S PREMIER JURIED EXHIBITION and sale" is how the Smithsonian Craft Show is billed. In fact, it is the only such show to receive a "perfect 10" for "quality of artworks" in National Association of Independent Artists surveys. Just 120 of the 1,540 artists who applied to be in the 1999 show were accepted. The halogen table lamp at bottom left, by Andi and Robert Moran, is titled *Roost*. "Our design was inspired by the hanging gourd birdhouses that people here in Louisiana put in their yards," Andi explains. "It's sculptural lighting, of course; not so much for reading. The little lampshade at the top is ceramic as are the balls, which are the size of grapefruits." Debora Muhl coiled Maine sweet grass to make her basket (top right). Steve Madsen's entryway table (bottom right) has a bowl atop it, "for keys and stuff." Stuart Golder weaves ultra-thin wires of precious metals into his necklaces and bracelets (top left). The base of Ann Hall-Richard's pot-shaped sculpture (bottom center) is cast from abaca and flax pulp; the upper part is woven linen. The 17th annual Smithsonian Craft Show, April 15-18, will take place at the National Building Museum in Washington, D.C. See www.smithsonianmag.si.edu for more pictures of works by this year's participants. —*Bruce Hathaway*

SMITHSONIAN HIGHLIGHTS



How Texaco's relentless pursuit of energy pumped new life into an old field.

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SMITHSONIAN HIGHLIGHTS

The Promise of America

At the close of the 19th century, the United States had become the industrial powerhouse of the world. The catalyst behind this growth was pursuit of the American Dream—equality, democracy, land, abundance, progress, opportunity, freedom and independence. In a new permanent exhibition at the National Museum of American History, *Communities in a Changing Nation: The Promise of 19th Century America*, dynamic panoramas, more than 200 historical artifacts and almost 400 photographs, illustrations, graphics and personal recollections are used to explore what the promise of America meant to three different communities in the 1800s. Visitors walk through the industrial era in Bridgeport, Connecticut, relive the Jewish immigrant experience in Cincinnati, Ohio, and witness slavery and freedom among African-Americans in Charleston, South Carolina.

George and Martha

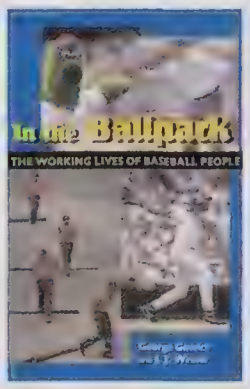
A special exhibition of 25 portraits of George and Martha Washington is on view at the National Portrait Gallery through August 8. *George and Martha Washington: Portraits from the Presidential Years* marks the 200th anniversary of the first President's death in 1799. During his eight years in office (1789-1797), Washington sat for more than a dozen artists, each hoping to convey his character to future generations. The paintings, ranging from works by little-known artists of varying talent to portraits by established artists such as Gilbert Stuart, were made at a time when many people believed that the shapes of an individual's features reflected that person's mental and emotional characteristics.

SMITHSONIAN Website

WWW.SMITHSONIANMAG.SI.EDU

Another place to start finding out about the exhibitions, events, publications, programs and activities of the Smithsonian is our Website. There you will find *Highlights* with links to the many pages of the Smithsonian Institution Website.

Books



In the Ballpark: The Working Lives of Baseball People by George Gmelch and J. J. Weiner ($15.95 paper). Interviews with an umpire, a mascot, a manager, a groundskeeper, an announcer and others in the sport.
Backbeat: Earl Palmer's Story by Tony Scherman ($24.95 cloth). The life story of a studio musician who created the backbeat rhythm of rock and roll.
A Wasp Among Eagles: A Woman Military Test Pilot in World War II by Ann B. Carl ($21.95 cloth).
To purchase these and other books published by the Smithsonian Institution Press, call 1-800-782-4612.

Exhibition Catalogues

Catalogues currently available include:
Blue Mystery: The Story of the Hope Diamond ($9.95 paper)
Picturing Old New England ($32.00 paper)
Franklin and His Friends ($34.95 paper)
Hans Namuth Portraits ($39.95 cloth)
To order, send check or money order to Smithsonian Museum Shops, 8308 Cinder Bed Road, Lorton, Virginia 22079. Include 15 percent of purchase for postage and handling (minimum charge, $4.50).

Exhibitions, Events

NATIONAL MUSEUM OF AFRICAN ART

Baule: African Art/Western Eyes (through May 9) Exhibition of more than 150 works by Baule artists of the Ivory Coast contrasts how the Baule experienced these objects and how Western museums have traditionally presented them.
Sokari Douglas Camp: Church Ede, A Tribute to Her Father (through June 20) Installation of *Church Ede*, a monumental kinetic sculpture reminiscent of a Kalabari funeral bed, by the Nigerian artist.

NATIONAL MUSEUM OF AMERICAN ART

L'Opéra (through April 25) Inside David Beck's miniature opera house, a tribute to the world of grand opera, viewers can see more than 200 mechanized figures performing or watching the splendid procession from Act II of Verdi's *Aida*. In the audience, characters from *The Ring*, *Turandot* and *Mefistofele* sing along and sway in their seats. Visitors can see the figures in action daily between 11 A.M. and 3 P.M. A video clip of *L'Opéra* can be seen at www.smithsonianmag.si.edu.
Picturing Old New England: Image and Memory (April 2-August 22)

RENWICK GALLERY, NMAA

Dominic Di Mare: A Retrospective (through July 25) Weavings, handmade paper, wall pieces, sculpture.
Shaker: Furnishings for the Simple Life (through July 25)

NATIONAL MUSEUM OF AMERICAN HISTORY

The Feather Trade and the American Conservation Movement (through August) In recognition of the centenary of the movement, this showcase (also in virtual form on the NMAH Website) explores the turn-of-the-century fad for feathered hats and its effect on wild bird populations.

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Not for children or those with glaucoma, difficulty in urinating, or an allergy to scopolamine or other belladonna alkaloids. In clinical studies, some side effects were noted, including blurred vision, dryness of the mouth (in two-thirds of users) and drowsiness (reported incidence less than 1 in 6). While using this product, you should not drive, operate dangerous machinery or do other things that require alertness. Avoid using alcohol. If you are elderly, your physician should exercise special care in prescribing this product. See adjoining page for additional information on potential adverse reactions or side effects.
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Brief Summary
(For full prescribing information, see package insert)

INDICATIONS AND USAGE: Transderm Scōp is indicated for prevention of nausea and vomiting associated with motion sickness in adults. The patch should be applied only to skin in the postauricular area.

CONTRAINDICATIONS: Transderm Scōp is specifically contraindicated in persons who are hypersensitive to the drug scopolamine or to other belladonna alkaloids, or to any ingredient or component in the formulation or delivery system, or in patients with angle-closure (narrow angle) glaucoma.

WARNINGS: Transderm Scōp should not be used in children and should be used with special caution in the elderly. See PRECAUTIONS.

Since drowsiness, disorientation, and confusion may occur with the use of scopolamine, patients should be warned of the possibility and cautioned against engaging in activities that require mental alertness, such as driving a motor vehicle or operating dangerous machinery.

Potentially alarming idiosyncratic reactions may occur with ordinary therapeutic doses of scopolamine.

PRECAUTIONS

General: Scopolamine should be used with caution in patients with pyloric obstruction, or urinary bladder neck obstruction. Caution should be exercised when administering an antiemetic or antimuscarinic drug to patients suspected of having intestinal obstruction.

Transderm Scōp should be used with special caution in the elderly or in individuals with impaired metabolic, liver, or kidney functions, because of the increased likelihood of CNS effects.

Caution should be exercised in patients with a history of seizure or psychosis, since scopolamine can potentially aggravate both disorders.

Information for Patients: Since scopolamine can cause temporary dilation of the pupils and blurred vision if it comes in contact with the eyes, patients should be strongly advised to wash their hands thoroughly with soap and water immediately after handling the patch. In addition, it is important that used patches be disposed of properly to avoid contact with children or pets.

Patients should be advised to remove the patch immediately and contact a physician in the unlikely event that they experience symptoms of acute narrow-angle glaucoma (pain in and reddening of the eyes accompanied by dilated pupils). Patients should also be instructed to remove the patch if they develop any difficulties in urinating.

Patients should be warned against driving a motor vehicle or operating dangerous machinery while wearing the patch. Patients who engage in these activities should also be aware of the possibility of withdrawal symptoms when the patch is removed. Patients who expect to participate in underwater sports should be cautioned regarding the potentially disorienting effects of scopolamine. A patient brochure is available.

Drug Interactions: Scopolamine should be used with care in patients taking drugs, including alcohol, capable of causing CNS effects. Special attention should be given to drugs having anticholinergic properties, e.g., belladonna alkaloids, antihistamines (including meclizine), and antidepressants.

Carcinogenesis, Mutagenesis, Impairment of Fertility: No long-term studies in animals have been performed to evaluate carcinogenic potential. Fertility studies were performed in female rats and revealed no evidence of impaired fertility or harm to the fetus due to scopolamine hydrobromide administered by daily subcutaneous injection. In the highest-dose group (plasma level approximately 500 times the level achieved in humans using a transdermal system), reduced maternal body weights were observed.

Pregnancy Category C: Teratogenic studies were performed in pregnant rats and rabbits with scopolamine hydrobromide administered by daily intravenous injection. No adverse effects were recorded in the rats. In the rabbits, the highest dose (plasma level approximately 100 times the level achieved in humans using a transdermal system) of drug administered had a marginal embryotoxic effect. Transderm Scōp should be used during pregnancy only if the anticipated benefit justifies the potential risk to the fetus.

Nursing Mothers: It is not known whether scopolamine is excreted in human milk. Because many drugs are excreted in human milk, caution should be exercised when Transderm Scōp is administered to a nursing woman.

Pediatric Use: Children are particularly susceptible to the side effects of belladonna alkaloids. Transderm Scōp should not be used in children because it is not known whether this system will release an amount of scopolamine that could produce serious adverse effects in children.

ADVERSE REACTIONS: The most frequent adverse reaction to Transderm Scōp is dryness of the mouth. This occurs in about two thirds of the people. A less frequent adverse reaction is drowsiness, which occurs in less than one sixth of the people. Transient impairment of eye accommodation, including blurred vision and dilation of the pupils, is also observed.

The following adverse reactions have also been reported on infrequent occasions during the use of Transderm Scōp: disorientation; memory disturbances; dizziness; restlessness; hallucinations; confusion; difficulty urinating; rashes and erythema; acute narrow-angle glaucoma; and dry, itchy, or red eyes.

Drug Withdrawal: Symptoms including dizziness, nausea, vomiting, headache, and disturbances of equilibrium have been reported in a few patients following discontinuation of the use of the Transderm Scōp system. These symptoms have occurred most often in patients who have used the system for more than three days.

OVERDOSAGE: Overdosage with scopolamine may cause disorientation, memory disturbances, dizziness, restlessness, hallucinations, confusion, psychosis, convulsions, bronchospasm and respiratory depression, and muscular weakness. Should these symptoms occur, the Transderm Scōp patch should be removed immediately, adequate hydration should be maintained, and appropriate symptomatic treatment initiated.

CAUTION: Federal law prohibits dispensing without prescription.

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NATIONAL MUSEUM OF NATURAL HISTORY

The Rocks Gallery completes the installation of the Janet Annenberg Hooker Hall of Geology, Gems and Minerals.

Tigers! The diorama is presented in conjunction with the National Zoo's *Great Cats* hill, featuring *Tiger Tracks*, an interpretive trail for children.

NATIONAL AIR AND SPACE MUSEUM

And a Star to Steer Her By A planetarium show (fee) and an accompanying exhibition, *GPS: A New Constellation*, explore the history of navigation, from the ancient mariners to the latest satellite technology.

HIRSHHORN MUSEUM & SCULPTURE GARDEN

Directions: Julião Sarmento: Fundamental Accuracy (through June 20) New figurative paintings and sculptures by this Portuguese artist, who was the hit of the 1997 Venice Biennale.

The Hirshhorn Collection at 25 In celebration of the Hirshhorn's 25th anniversary, a floor-wide reinstallation, in renovated galleries, of works by Hopper, de Kooning, Giacometti and other modern-art favorites.

COOPER-HEWITT, NATIONAL DESIGN MUSEUM
[NEW YORK CITY]

Graphic Design in the Mechanical Age: Selections from the Merrill C. Berman Collection (through May 23) Posters, paintings, drawings and collages created between the two world wars.

NATIONAL POSTAL MUSEUM

Mayhem By Mail Explores three categories of crime investigated by U.S. Postal Inspectors. Objects include a reconstructed mail bomb and a tommygun used in a 1923 train robbery.

As Precious as Gold The importance of letters from home during the Alaska/Klondike gold rush.

What's in the Mail for You! High-tech interactive exhibit about the direct mail industry.

Artistic License: The Federal Duck Stamp Story

ARTHUR M. SACKLER GALLERY

Devi: The Great Goddess (through September 6) The first major exhibition examining India's all-powerful female deity in all her various guises. Free public programs of Indian music, dance and film related to the Hindu goddess are scheduled throughout the exhibition period.

Behind the Himalayas: Paintings of Mustang (through September 26) Watercolors by Australian architect and artist Robert Powell of the Himalayan region known as Mustang, politically part of Nepal but geographically part of Tibet. See "Smithsonian Highlights," SMITHSONIAN, March 1999.

FREER GALLERY OF ART

Selections from the Japanese Collection and the Tea Ceremony in Japan (April 4 through November 26) Objects on display were selected by guest curators from the Urasenke Tradition of Tea, an international organization dedicated to the study of the Japanese tea ceremony.

ARTS AND INDUSTRIES BUILDING

Discovery Theater Live theater for youngsters featuring, from April 27 through May 7, "The Escape," a 19th-century tale—for both children and adults—of fugitive slaves and the Underground Railroad. Call 202-357-1500 (voice or TTY) weekdays, 8 A.M.-4 P.M.

SMITHSONIAN INSTITUTION TRAVELING EXHIBITION SERVICE

Not coming to Washington? The Smithsonian may be coming to you! Each year, SITES circulates exhibitions of all shapes, sizes and subject matter to more than 250 venues throughout the United States and abroad. To sponsor a show in your

community, write to: SITES, Smithsonian Institution, Washington, D.C. 20560. A listing of current exhibitions and additional information is available at www.si.edu/sites.

THE SMITHSONIAN ASSOCIATES RESIDENT ASSOCIATES PROGRAM

On virtually any evening, and during the day on weekends, there are several events—lectures, concerts, readings—to choose from. A concert of *conjunto norteño* music, on Saturday, April 24, will feature 1999 Grammy winner Flaco Jimenez as part of the series "Musica de las Americas." To purchase tickets for this concert and for information on many other Smithsonian Associates programs, call 202-357-3030, or visit www.si.edu/tsa.

Planning a Smithsonian Visit?

THE CASTLE—INFORMATION CENTER

Begin your visit at the Smithsonian Information Center's Associates' Reception Desk—open 9 A.M. - 4 P.M. daily—in the Castle. Special materials and information on exhibitions, activities and dining await you there. Learn what's new at the Smithsonian and other capital attractions—with brochures, videos, touch screens, electronic maps and more. Smithsonian museums are generally open 10 A.M.-5:30 P.M. daily, except December 25. Receive a free Associates' planning packet: write to Smithsonian Information, Smithsonian Institution, Washington, D.C. 20560-0010, or send your request via e-mail to info@info.si.edu, or call 202-357-2700 (voice) or 202-357-1729 (TTY), 9 A.M.-5 P.M., Monday-Friday; 10 A.M.-4 P.M., Saturday-Sunday. Note: Parking on the Mall is limited; Metrorail (subway) is convenient to most museums.

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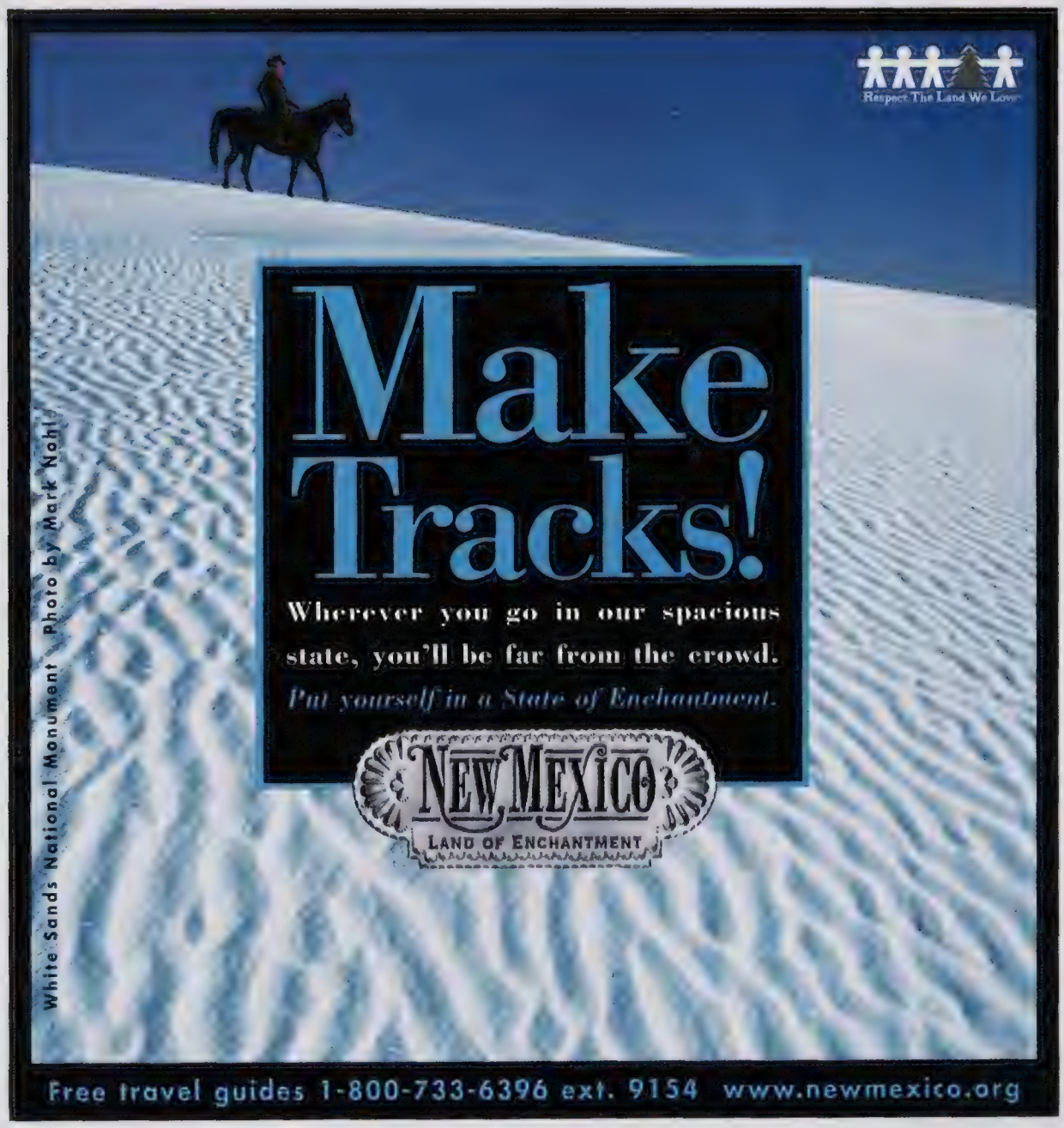
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Good Days at Black Rock

A ONCE QUIET DESERT IN NEVADA HAS BECOME A CENTER FOR SUPERSONIC CARS, ROCKETS WITH BIG PLANS AND ONE OF THE MOST FREEWHEELING FESTIVALS ANYWHERE

BY JAMES R. CHILES

WE'VE BEEN SITTING IN LAWN CHAIRS PROVIDED by this hospitable group from Reno, relaxing under a cabana, drinking beer from frosty cans and pondering the long view to the north. The air of this September afternoon has been still for hours, with only puffs of heated breeze. But Rick Rinabarger, a manhole cover salesman on vacation, calls my attention to an interesting development moving in from the southwest: a white-brown wall of dust maybe 500 feet high, rolling toward us along the dry lake bed. A portentous

PHOTOGRAPHS BY CHAD SLATTERY

Hitting speeds of 30 miles per hour, a land sailor steers his rig across a flat, dry lake bed in the Black Rock Desert.

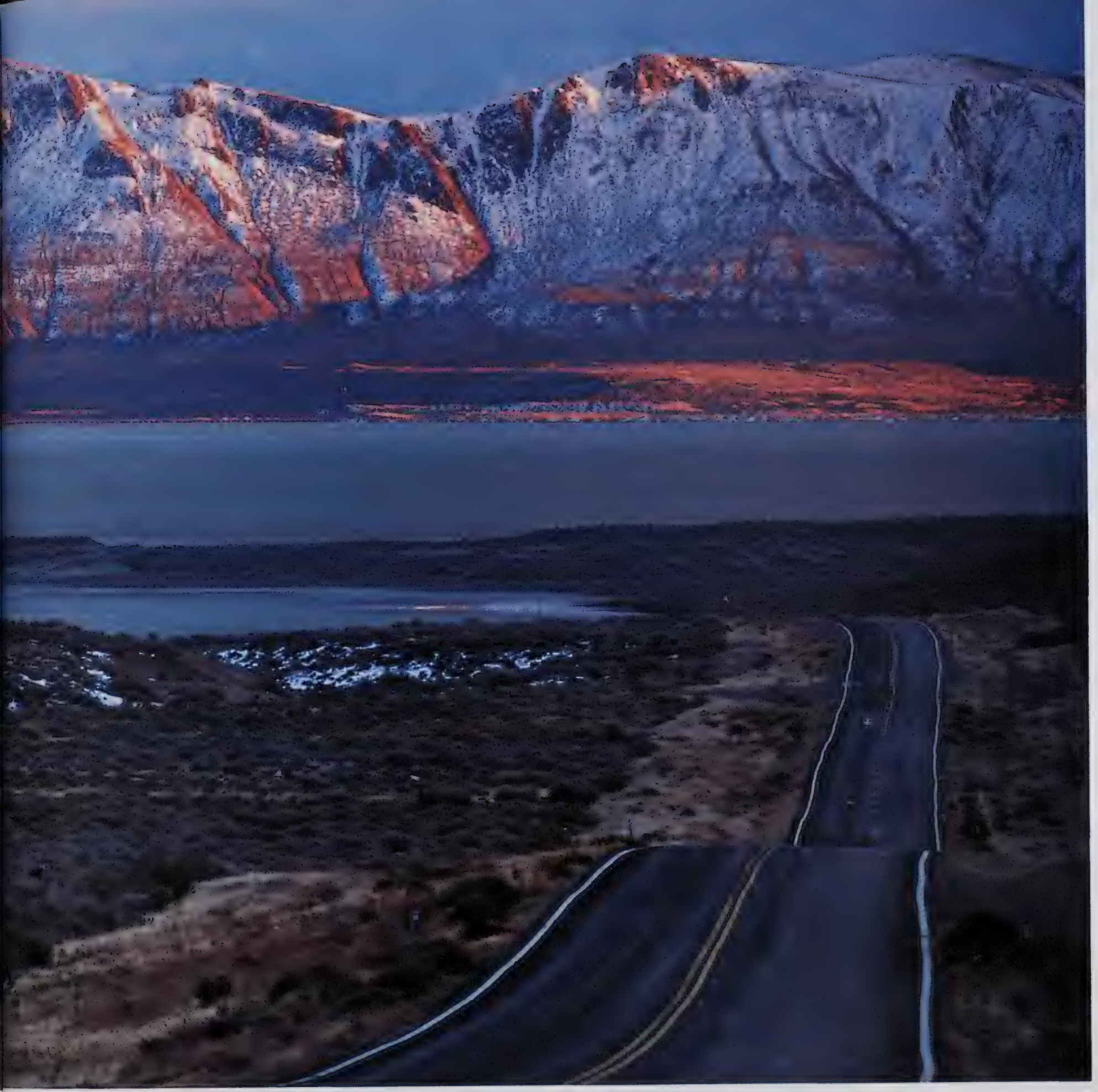
Seen looking east at sunset, a deserted highway shows the way to a seasonally water-filled playa with the mountains beyond.

blue cloud hangs above it, and thunder echoes off Elephant Mountain. Soon the tarp of the shelter begins to flap loudly. We jump up to set upright the land sailing boats, three-wheeled rigs analogous to ice boats. In just seconds Dave Roberts, a retired communications engineer, and I are aboard a two-seater and rolling at the pace of a horse in full gallop. When he enters a northern tack at a full sideways skid, I hang on and hope my car keys are still in my pocket. The four boats gain speed again and skim along, occasionally bumping each other, playing tag.

The dusty wind builds and builds until one side wheel lifts off the ground. But rain follows wind, and soon fat raindrops are pelting me. Even with sunglasses I can't keep my eyes open. Roberts can't steer on the slick surface anymore, and the front wheel is slinging mud at us faster than the rain can wash it off.

"I guess that's enough fun for now," Roberts yells over the weather. We turn the machine on its side and run for shelter. Rinabarger slaps me on the shoulder and says, "Welcome to the Black Rock!"

The Black Rock Desert, land of dusty grandeur, is not a name that most people recognize immediately; it's a place



that fewer have seen firsthand. "It's the empty quarter, the vacant heart of the West," says Larry Harvey, the director of the Burning Man Project, an annual arts festival here. No major highways or cities mark the maps for this corner of northwest Nevada. But some of the events transpiring here might sound familiar even so: the site of the world's first supersonic land speed record, by a British jet-propelled car called the *ThrustSSC*, and the no-holds-barred Burning Man festival that has been growing in attendance by thousands every year. It's the place with elbow room, one of the biggest flat spots on earth.

Perhaps 8,000 settlers crossed this alkaline wasteland in 1849, but explorers found safer routes in the 1850s. Over the decades the Western Pacific Railroad built a track alongside, and occasional ranchers and hunters used it for a shortcut to somewhere else. World War II aviators trained overhead; my father learned aerial gunnery here.

The lid came off in the 1990s. Now people come from hundreds of miles away to run their cars wide open on the flats, or playa, to launch rockets to amazing heights, to play golf on painted greens, and to fly hot-air balloons and hang-gliders. While the playa is the big draw, visitors also

range onto the high ground nearby. They four-wheel across the chaparral, scouting for traces of pioneer days. Or they soak their cares away in hot springs scattered around the fringes of the playa. To some longtime desert rats, particularly hikers, trail preservationists and land sailors, the silence that was golden is gone.

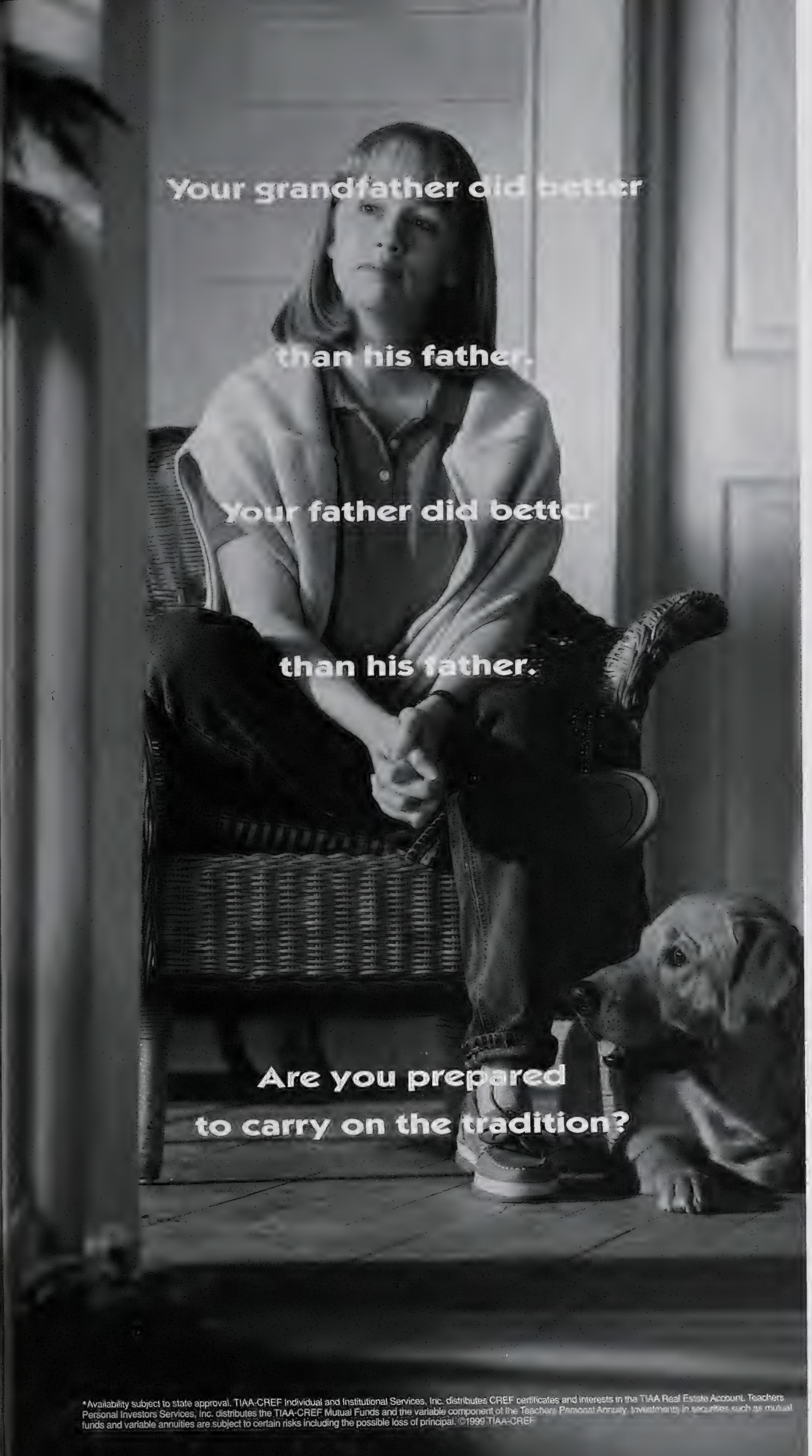
The good news is that the land's caretaker, the U.S. Bureau of Land Management, now has helpers to clean up the messes left by decades of careless use. Volunteers learn "leave no trace" use, and then don the BLM cap and come to work several days a year. They dredge trash from hot springs, watch over fragile ecosystems during busy weekends and photograph heavy-traffic areas to monitor for ongoing damage.

With advice from the locals, I find an overlook off a dirt road to survey the area. I feel like a satellite: from up here with a pair of binoculars it's possible to see anything of human size moving across the bare ground within 10 or more miles, and at the far reaches, I can see a mountain about 50 miles to the east. It's clear from here that the Black Rock Desert is a vast basin. The playa is the flat area between the mountain ranges, a stretch of desert floor that most winters becomes a shallow lake. On the map, it is roughly the shape of a slanted "Y." The most famous part, about a fifth of the total, covers 150 square miles; it's devoid of vegetation and big enough to hold 18 million cars if arrayed in parking-lot fashion. Surrounding the playa is brushy, rocky ground that rises into dry but colorful mountains at all points of the compass. The well-named Calico Hills provide a riotous splash of white, yellow, brown and red on the north side.

Visible from here is the Black Rock Desert's namesake: a promontory of black volcanic and sedimentary material, sitting on the edge of the playa at the southern tip of the Black Rock Range. Settlers used Black Rock as a landmark while crossing the playa by horse, wagon and foot. Because there's been very little development since then, the view in that direction is just about the same as it was in 1849. Yes, there have been proposals to change that—a big open-pit gold mine in the Calicos, and a giant landfill to hold San Francisco's trash—but neither happened.

It's mainly the plain that is attracting crowds of, well, the crowd-weary. Try and mesh this with the judgment of wagoneers who had to cross it during the gold rush: "It seemed to be the River of Death dried up," wrote pioneer Jesse Quinn Thornton, "a wide waste of desolation where even the winds had died." One hundred fifty years later,

Marked with neon lights, the 40-foot Burning Man, namesake of the festival, is packed with wax-soaked burlap and firecrackers.



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A "mobile living room" tours Burning Man's temporary city. The couple below are among the more conservatively dressed.

the playa is so much in demand, and demands are escalating so quickly, that the BLM is pondering what to do in the future if public use continues to grow at the current rate.

I can understand why Black Rock is special to a small but elite class of car builders. It's one of a few places on earth with a straightaway that is broad and flat enough for cars to hit supersonic speeds. That quality led to the most famous event to happen here since the gold rush: the 1997 competition for the world land speed record between Richard Noble's *ThrustSSC* and Craig Breedlove's *Spirit of America*. Each group had come to Black Rock in earlier years, but never at the same time. They shared a 13-mile-long stretch of playa northeast of Gerlach, the only town for miles. After five weeks of preparation, the twin-engined British model, driven by Andy Green, broke through the sound barrier on October 15, setting an official supersonic record in two directions. The final sonic boom knocked light fixtures off the ceiling in Gerlach's high school; a shock wave trapped under the car during its last runs plowed up a strip of playa six miles long.

A year later when I visit, the field is wide open for other users. There are some barely visible tracks and a few low sandpiles remaining near the Breedlove camp. For real proof that the face-off actually happened you'd have to cruise the five bars of Gerlach to verify it with the signed posters and souvenir photographs that the two crews left. Bar owner Bev Osborn organized lodging in town for the British crew. At 5 A.M. every racing day, a couple of women from the town laid out a big breakfast in the community center.

The town of Gerlach (pop. 350) is something of an artificial oasis, set as it is between the Black Rock and Smoke Creek deserts. It has the only motel and the only officers of the law for miles. There are two of the latter, both working to keep the northern end of Washoe County safe: Deputy Sheriff Milt Perry along with his trusty dog, Aldo, and Justice of the Peace Phil Thomas. The court and the sheriff's field station share a pocket-size concrete-block building on West Sunset Boulevard, just off the short length of curving highway that is Main Street.

Every year the tiny town and its down-to-earth inhabitants are invaded by thousands of revelers looking for complete freedom to do whatever it is they do. It is the Burning Man festival, and the only limits are those of the imagination. Many of the locals are less than enthusiastic.

"I think people are getting tired [of the festival]," Thomas says. "It just inundates the town. . . . The main thing is that it doesn't really reflect the northern Nevada rural life. This is basically a working environment, a survival mode of operation." If anything illustrates his point, it's Justice Thomas' pickup, which he calls the Grapes of Wrath. It's a brown and white four-wheel-drive Chevy of indeterminate age, and the bed is heaped with the stuff of survival: split firewood, an old washing machine tank that serves as a fire ring, jerricans of spare gasoline and water, two spare tires, an axe, chains, jacks, flares, assorted tools and a hose for transferring gasoline from one vehicle to another.

This kind of gear is essential for the distant reaches of the Black Rock, but those venturing there better bring

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Members of a California club display their birds. The rocket at far right, rear, is a two-stage and will go the highest, 30,000 feet.

along a few other things, Thomas says: namely, "common sense and a knowledge of when to panic and when not to panic." He recalls a violent thunderstorm that in 1994 swept through the Burning Man camp, located that year far out on the playa. Some people jumped in their cars and tried to drive for shelter. "Some scattered and got lost, some headed east for the lights at the Hycroft mine thinking it was Gerlach, some hiked to Sulphur [a ghost town] and a couple of guys decided to set a historic building there on fire as a signal for help," says Thomas.

This is not to say that all Burning Man visitors are rash city folk, adrift on the great inland sea of alkaline clay. Some are seasoned desertgoers. Larry Breed, designer of the trash fence that helps keep litter under control at Burning Man, is a member of the Desert Survivors, a feisty group of environmentalists who pride themselves on their long hikes through the wilderness with minimal supplies.

In the same way that Burning Man ticket-buyers arrive with different backgrounds, they have their own reasons for making the trek to northern Nevada. Maybe it's a

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At sunrise, when the air is relatively still, a hot-air balloon rises slowly. On this day it will drift south across the playa.

call back to Precambrian roots. "It's almost a sub-desert, a proto-desert," according to participant Ted Hullar. "Where's the cactus, the creosote bush, the scorpions?" he asks, gesturing toward playa that stretches over the horizon. "It reminds me of that old computer game Battlezone, where you'd drive and drive and the mountains would never get any closer."

Hullar and friends are here for the largest and most flamboyant use of the desert, the Burning Man Project. In 1998, its ninth year in Nevada, the ephemeral "Black Rock City" grows to hold 15,000 people despite the usual pre-festival warnings of brain-baking heat alternating with blinding dust storms and rain squalls. For a week its trailers, tents and art installations, laid out in a two-mile arc of temporary streets and esplanades, add up to what would be the eighth-largest city in Nevada. Bring together the National Lampoon staff, Mardi Gras and a high school science fair in a Woodstocky camp setting, and you'd be getting close to the scathing parody and techno-culture that thrives here. The $100 admission at the gate seems pricey to me, but to thousands of fun seekers, many from the Bay Area of California, it's a once-a-year chance to dress up (or undress) and drop in on the closest thing to an alien planet right here on earth.

The celebration hits a peak on Sunday night before Labor Day. Neon-lit bicycles and motorized couches roll through the smoke and dust, as drummers, dancers and fire-eaters pump up the crowd. It's a night to howl as the moon rises and a 40-foot timber statue stuffed with burlap soaked in wax and fireworks ignites with a roar, in a sort of pagan pyrotechnic ritual. Eventually the structure collapses in a heap, showering sparks over the happy throng. As green laser beams hover over the tumult, I ponder how I'd go about explaining all of this to the early settlers.

But Labor Day is the morning after, it's almost a full day's drive back to the Coast, and by 10 A.M. Black Rock City looks like a refugee camp packing up in the face of an oncoming army. A long line of cars crawls toward the only exit. A bearded man on a bike rides through the emptying campsites, bellowing through a megaphone: "Pick up your bad art and take it back with you!"

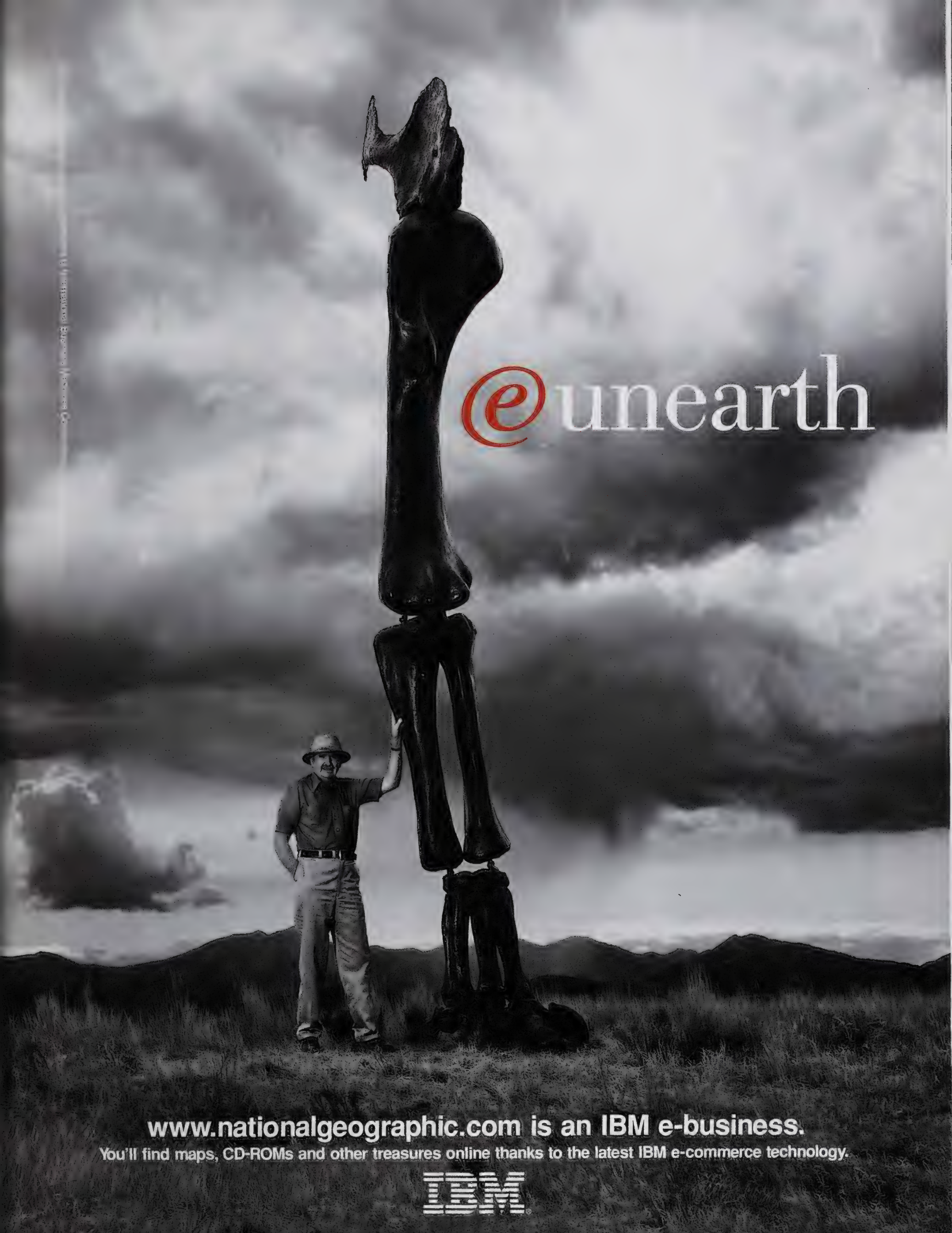
And everything else; the BLM has given director Larry Harvey and his crew of workers and volunteers only a few weeks for the entire cleanup, if they want to be in good stead for next year's permit. I help collect cigarette butts and firecracker shrapnel. By noon, in at least one spot, nothing is left but wheel marks and footprints in the dirt.

That's the kind of leave-no-trace behavior that Mike Bilbo likes to see. Once an artillery observer with the Army, he is now an outdoor recreational planner for the BLM. His job title suggests someone who huddles over a computer, typing up permits and printing thick volumes of environmental statements. And indeed Bilbo does that during the weekdays, which leaves mostly weekends to cruise the hundreds of miles over the desert in a tan BLM pickup, stopping to talk with visitors and recruit volunteers.

On this particular Friday evening in September, Bilbo is leading BLM volunteer Paul Campbell on an old-car hunt. Driving along the edge of the playa, he tells me that he knows of at least five abandoned hulks that people dumped by the playa long ago. Bilbo has a slow, slightly hesitant manner of speaking, but he knows what he wants. "My objective is to get all the garbage off this playa," Bilbo says, and spits a sunflower seed husk out the driver-side window. "There's bits and pieces all over the place from the 1950s and '60s . . . We've got about 300 years of work to do here."

The numerous dunes make it difficult to spot half-buried cars. I wield binoculars and find this moment somehow symbolic of what the BLM is up against out here. The Black Rock playa is breathtakingly big, but even so it's just a nibble out of the total 8.5 million acres that the BLM office in Winnemucca, Nevada, is supposed to watch over with a staff that could fit in the average living room. Decades ago, the office dealt mostly with a small group of miners and ranchers. Now the mailing list holds dozens of recreational and political groups. Some groups want more tourism, some a lot less. Some want more mining, some oppose it.

In the pink light of dusk we spot a car skeleton lurking behind a dune. Bilbo stops and explains what he wants to Campbell, a model rocketeer from Oakland, California, who is at Black Rock for launches over the weekend. Campbell's group, called Aero-Pac, has brought a heavy-duty truck to the playa to tote rockets, and Bilbo would like them to take the truck, yank this half-buried car out of the muck and drag it off the playa for disposal. Campbell marks the spot with a fix from his pocket-size GPS receiver and proposes to do the job on Sunday. We find the carcass of one more automobile, then turn back to the rocket camp.



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Ray Cirino's *Water Woman,* installed during the 1997 festival, graces a hot spring reservoir on private land near the playa.

While I'll agree with rocketeer Tom Rouse that "half the lure is coming out to this beautiful spot," the rest of the lure is apparently physics. Aero-Pac members want to fly oversized handbuilt rockets as far and high as they can go, and the flight paths need a lot of acreage so the rockets can land without hitting anybody. The biggest rocket I come across is Rouse's *Hercules,* a monster 15 feet long and weighing 79 pounds, including its payload, a video camera and a computer. Twenty pounds of high-energy propellant, about $500 worth, lifts the *Hercules* about three miles above the playa while I'm there. The Federal Aviation Administration is granting the club launch clearance to 100,000 feet this weekend for limited time slots, and in coming years some of its members hope to loft their rockets up almost to the altitude of low-orbiting satellites.

That's the bar set by the creators of the CATS (Cheap Access To Space) Prize. The winning team stands to take home $250,000 if it can lift a little more than four pounds

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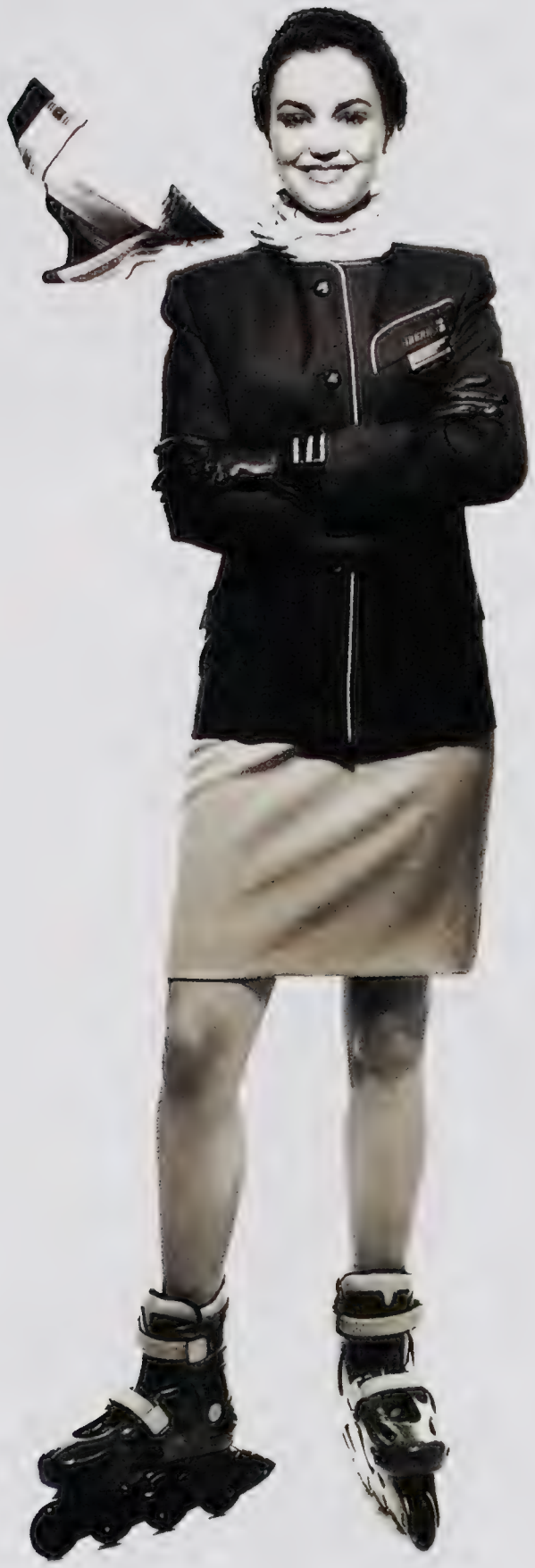

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Drilling produced these three geysers years ago; the mounds build up from minerals in the water. The water itself ends up in the reservoir.

about 120 miles above earth before November 2000. Rouse, a contractor from San Jose, is making a run for the prize. "It's all the same: build a house, build a rocket," he tells me. He's at Black Rock this weekend to test electrical gear that might be used in a later CATS attempt, and also to pass a final test that will allow him to use larger motors.

For Aero-Pac members like William Walby, a research physiologist, the rocket launches are more for fun. Walby was here as a boy in the 1960s, coming up from Reno with his parents for occasional picnics and rocket launchings. Now, he says, it's a place to mix and mingle with a "very eclectic" group of people.

On Saturday evening the rocketeers take a break for dinner. I hear eager talk regarding a recent breakthrough in desert living: a gasoline-powered margarita mixer. There is one last round of low-altitude night launches to close out the Saturday schedule. Pius Morozumi, a physician from the Bay Area, fires a maroon-and-gold rocket, the *Splintomatic*, at the darkening zenith. We see its strobe light coming down, but the beacon winks out on impact. He and I go looking for it. Strolling on the playa at twilight is strange and dreamlike: the idling pedestrian could walk a mile and seemingly not progress at all, because the ground lacks any feature or vegetation and landmarks are so distant. As the last of the daylight fades, no rocket slides into sight. A spray of stars is emerging overhead now and we pause to enjoy the moment. Twenty miles to the east, a handful of yellow and white lights twinkle in the darkness; that's the Hycroft Mine, an open-pit affair that extracts mighty truckloads of powdery ore to harvest its gold and silver. Some playa users have complained that the lights degrade the desert experience. Others have gone there for help in emergencies.

Morozumi says he isn't worried about his rocket, and we turn back to camp. The *Splintomatic* is a patched-up affair anyway, and should be easy to find the next day. "It cannot be killed," he says. If a car doesn't run over it, that is. The rocket group's experience later that night suggests that a once-deserted desert is getting distinctly busier. About 9 o'clock, a pickup truck looms out of the darkness and tries to drive between the launchpads and control panels, right over the electrical cords. Morozumi and friends run over, waving flashlights, to warn the driver off with stern words.

Ready or not, Black Rock is set to get more traffic in 1999. Craig Breedlove is coming back for another try at the land speed record, and there are plans for national soaring and rocket-launching events. And this on top of the usual list of summer and fall gatherings.

Returning to my rental car on the playa after a hot-air balloon trip in late October, I find the vehicle sitting a scant few hundred feet from a brand-new waterfront. Although it hasn't rained on the desert for two weeks, this end of a shallow lake is coming my way at almost five feet per minute. Perhaps it's fueled by some delayed freshet from the mountains flowing down the Quinn River; perhaps by wind pushing from the east. The water makes a scurrying sound because it carries a thin glasslike layer of ice. Plates of ice scoot forward a few inches, wait for the water to catch up, and scoot again. It sounds restful, but it turns clay to instant mud; such wind-driven lakes can sneak up on a camp at night and trap an unwary vehicle for weeks or even months. This is how the playa takes control at the end of each year, running off visitors and scrubbing away their tire marks. Over the wet months to follow, this shallow lake will grow until it covers all the low ground, not surrendering to dry land until May or June. In extremely wet years it can stretch for dozens of miles. I sample the lake water, famous for alkali. It tastes like old dishwater.

I move my car ten miles west and join a small group of land sailors biding time as they wait for good wind. Funneled between the mountains, a strong northeasterly builds by afternoon. I borrow a boat from a Nevada revenue agent and his wife. The sail hums a traveling song as I point the nose wheel toward the Selenite Range.

Local land sailors have printed up a bumper sticker with the slogan "You're In My Way." I can understand now why they feel the loss of solitude on Black Rock Desert perhaps more keenly than anyone; it's akin to the grief that cowboys of the 1800s felt over the fencing of the open range. But for today, the flood tide of change must await the turn of seasons. The crowds have gone away and we have earth's great flat spot all to ourselves.

Minnesota-based James R. Chiles has written most recently for SMITHSONIAN *on space debris, hoboes and radio towers. Chad Slattery, of West Los Angeles, shot the cover story on blimps in the June 1998 issue and the Getty Center article in December 1997.*

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You Can't Keep a Good Prophet Down

WHAT WILL TOMORROW bring? Should we carry an umbrella? Invest in corn futures, invade Gaul, book passage on the *Titanic*? Bet the farm on E-Z Strider in the fourth at Pimlico? Or will the world come to an end by noon? Inquiring minds want to know.

Since humans first grasped the notion of time, we've been annoyed at not being able to see forward in it. It seems unfair that we know last week so thoroughly and can't sneak even a glimpse of next week. We've always struggled to pull back the curtain, supporting a number of industries in the process. The newspaper prints our daily horoscope, based on our astrological sign, but it's usually something like, "A Sagittarius relative will say, 'You were right all along!'" If it doesn't happen, most people bright enough to read a paper stop checking it. Still, we feel there ought to be some light powerful enough to pierce the barrier. If we haven't yet found it, it's not for want of trying.

Foretelling the future falls roughly into two categories: interpretive divination, with the message arriving by means of an organized system, as in tarot cards, the *I Ching* and the weather forecast on the evening news; and intuitive divination, with the medium receiving the word from unseen powers, sometimes in a trance state. Both must be filtered through interpretation, sometimes wonderfully ingenious.

Many and various are the tools of diviners, from mainframe computers to a handful of pebbles to the mighty constellations overhead. Some of them must have panned out some of the time, since they've endured for millennia. Some have been lost to us, like the ancient art of haruspicy, or reading the insides of slaughtered animals (livers were particularly informative). Of ancient Etruscan origin, they say, this rather messy form of divination seems to have found its way as far as Malaya, Polynesia and Hawaii. The Inca of Peru inflated the lungs of a sacrificed white llama by blowing into them, and studied the patterns of the veins. Alexander the Great, who reportedly called on its practitioners, conquered the known world. It was popular in Rome, and Cicero wrote about it in his *De divinatione* around 44 B.C. The historian Plutarch suggests that before the Ides of March, Julius Caesar took it upon himself to cut open the customary creature and found it contained no heart. The rankest amateur would take this as a sign to stay

BY BARBARA HOLLAND ♕ ILLUSTRATIONS BY PETER DE SÈVE

home in bed, but Caesar went to the Senate anyway, where the assassins were waiting for him.

Perhaps this really was a useful system, but alas, few of us these days know how to read an entrail, and the technique, being a trade secret, has been lost. Not that sheep were off the hook, though; in Scotland, their shoulder blades were regularly consulted ("scapulimancy") in matters of births, deaths and marriages. Since even part of a dead sheep is inconvenient to carry around, smaller and lighter divining aids became popular, and amateurs could learn to work them without joining the haruspimancers' union, and set up in business for themselves.

For more than 3,000 years the Chinese have used the *I Ching*, or *Book of Changes*, as a basis of philosophy, science, statecraft and predictions. In China fortune-tellers still set up shop at street-corner tables, and some of their customers won't make a move without checking in first. One *I Ching* method involves counting out 49 yarrow stalks, which are processed to form hexagrams made up of solid and broken lines. Back in antiquity, the solid line meant "yes" and the broken line "no," but the lore ballooned in subtlety and scope. Now, for instance, four broken lines over two solid lines can mean, "Approach has supreme success. Perseverance furthers. When the eighth month comes, There will be misfortune."

The *I Ching* is not to be undertaken lightly; the translation published by Princeton University Press runs to 740 pages. The more complicated the rules, the more convincing the results, as can be seen in marketing studies, statistical projections and astrology.

Before we learned what they really are, the stars looked bigger and more important, and the ancients felt they must mean something. Along about the third millennium B.C. the Mesopotamians began tinkering with a way to figure them out, with the Babylonians eventually creating the 12 signs of the zodiac. The Egyptians refined it, the Greeks greatly improved the system, and it spread to China. By the late Middle Ages, no progressive European university could hold up its head without a chair of astrological science. Astrology predicted everything from wars to weather, and the sky's aspects at a person's birth were believed to define character and outline much of his or her future.

This was flattering. It was all very well for a deck of cards to take an interest in us, but to have the great wheeling constellations, light-years away and unimaginably huge, bend down to care about our love-life and travel plans was awesomely gratifying: we must be more important than even we had thought. Prince and pauper alike consulted the stars before they took important steps.

We still do, only now we like to think of ourselves as

scientific, so we keep quiet about it; the stars have gone underground. Sophisticates scoffed when they heard that President Reagan's wife checked in regularly with an astrologer and, based on the astral calculations, advised her husband when to schedule important matters, but Mrs. Reagan wasn't alone. The financier and philanthropist J. P. Morgan kept an astrologer on staff, and it's safe to suppose that if he hadn't found the fellow useful, he would have fired him. Your stockbroker may not want to tell you, but there's a chance he, too, cocks his eye at the heavens. Apparently, astrological advice is a big, if quiet, business in the market. One Wall Street astrologer claims to have 15,000 clients, including some from the largest money management firms; billions of dollars in investments, he says, are swayed by the stars. On the Internet, investment services can be found that boast of such systems as "using planetary 'trace' synthesis to predict market direction."

Mastering the essential skills of star-tracking will take you around three years, but if you have a knack for it, it might be as sound an investment as medical school.

For the impatient, there are faster ways to see tomorrow. In about the ninth century A.D., gypsies, more properly called Rom, moved out of northern India and kept on moving. Traveling hither and yon, they specialized in horse-trading and fortune-telling, occupations in which mobility is an advantage. The fortune-tellers used crystal balls, cards and dice, and read palms and tea leaves, passing the techniques down through the family.

Apparently, some people really do see things in crystals. Practice helps. The Maya of Guatemala use small crystals in divination rituals, along with the red seeds of the flute tree, and call them *ilb'al*, "instrument for seeing," the same word they use for eyeglasses and telescopes. The gypsies like a good-sized ball, which impresses clients. (Sometimes they gaze impressively even if they can't see shucks in the thing.) For best results, the ball should be wrapped in black silk when not in use, and once a month, or at the full moon, washed, dried and exposed to the moonlight for half an hour.

Reading tea leaves requires more imagination than tea. First the client drinks almost all the tea and, with her left hand, turns the cup around three times, swirling the liquid to spread the leaves, then tips it upside down, turns it around again and makes a wish. The seer then considers the blobs of tea stuck to the sides. Blobs closest to the handle are the most influential; nearest the rim, the most current; the blobs at the bottom foretell events that may be as far away as a year, which is as far as leaves can see. The list of possible shapes runs into the hundreds and calls for creative vision. A bird, for instance, means good news ahead, unless it's an owl, which means a new business venture probably will fail. You need to look sharply to distinguish a fox, signifying treachery, from a dog, meaning loyalty. Or, for that matter, to distinguish anything at all from a wet tea leaf.

The rankest amateur would take this as a sign to stay home in bed, but Caesar went to the Senate anyway, where the assassins were waiting for him.

Gypsies and tarot cards arrived in the West at about the same time, and while Romany fortune-tellers claim they can do just as well with a plain deck of cards—the Six of Diamonds can mean an unhappy end to a marriage—their customers get more bang for their buck from the tarot. It radiates dark mysteries. In the 14th and 15th centuries it was condemned by the church as the Devil's invention, banned in several European cities and burned in the marketplace in Nuremberg, so how could it be meaningless? The Fool; the journeying Hermit; the Hanged Man; that

raven with the King of Wands, bearer of hidden information; the utter ruin of the Ten of Swords, probably the darkest omen in the deck—the cards feel weighty as bricks with their load of secrets. The reader can lay them out in any of a variety of patterns, interpret them in almost any way, and only the most skeptical customer will disbelieve: cards like that must know a thing or two.

We feel the same way about computers. Tell us a prediction is the result of trillions of factoids copulating invisibly in a computer and giving birth to next year's consumer trends, pollution levels, crop yields or inflation rate, and we're as gullible as any Greek at Delphi. We yearn to believe. We want to believe in computers as ardently as our forebears wanted to believe in sheep's livers—or was it shoulder blades?

Astrology predicted everything from wars to weather, and its aspects at your birth defined your character and outlined much of your future.

What saith the computer? Will a huge asteroid slam into us at 1:30 P.M. on October 26, 2028, lobbing us back to the Stone Age? Maybe, maybe not. As of early March 1998, it seemed likely, but the next day the astronomers recalculated and changed their forecast. Everyone was greatly relieved.

And what of global warming? Just before it came to town, many in the climatological game were expecting another ice age any minute, and the opposite news was almost a pleasure; warming sounds better than freezing. Some of us secretly liked the idea of sunbathing in March, even at the expense of a few low-lying islands, but a scientific seer named William H. Calvin has other plans. As he explained in the *Atlantic Monthly*, earth's climate does sudden flip-flops every few thousand years, which tells him that soon, and quite abruptly, the climate of Europe could resemble Siberia's and Santa Barbara could feel like Juneau. In a world so unsuited for agriculture, many of us would quickly starve and the survivors would run amok, fighting over remaining food supplies.

We don't even know if it will warm up by Wednesday. We spend more than four billion dollars a year to have our short-term weather foretold, and the revelations of the National Weather Service—barring surprise events like tornadoes and those hurricanes that keep changing their minds—are really useful for about 24 hours from the moment of conception, making weather forecasters among the most successful of all professional predictors. They are still pretty good out to 48 hours, after which they begin to decline in accuracy. Eventually you might as well go back to the *Old Farmer's Almanac* with its secret formula, or watch the cat lick its paw, meaning rain, or the black bands on the woolly bear caterpillar, meaning cold.

Many on Wall Street are willing to pay a fortune to have their fortunes predicted by modern science, but when the market crashed in 1987, everyone was just as surprised as they'd been in 1929. It's enough to make a tea leaf blush. In 1985, the distinguished economist Ravi Batra wrote *The Great Depression of 1990*, computing the variables and predicting, in the absence of economic reforms, "the worst economic turmoil in history," an "impending cataclysm," the global depression of 1990 that will "plague the world

through at least 1996" and cause untold suffering. His words were number one on the *New York Times* best-seller list. Pundits trembled.

In technology, the many expert consultants and think-tank gurus hired to foresee innovations are dead wrong more than 80 percent of the time. Jules Verne did better than that. The term "foreseeable future" is an oxymoron. We like to think that, even though we ourselves may behave impulsively, everything else is organized and rational and therefore predictable. It isn't. If we lose our grip

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on a heavy object, it will probably hit the floor in the near future, but there isn't much else we can count on. Anything can happen. Winston Churchill tried to predict things for a while and then gave up, complaining that the future was just one damned thing after another.

Maybe we should abandon divination systems and go back to oracles. We could probably save money, since the diviners now have heavier investments in technology than they did in the heyday of tarot cards, and charge accordingly. Oracles enjoyed a worldwide following of satisfied customers for centuries, and if longevity is any measure of success, the Delphic establishment may have been the most successful prediction business ever, running full tilt for a thousand years, from 700 B.C. to A.D. 300.

The oracle of Apollo at Delphi was located at the foot of Mount Parnassus in central Greece, rather out of the way, since it wouldn't do just to stop off at the oracle for a quick read on your way to the grocery store. Its spokesperson was a woman—prophesying was one of the few respectable careers open to women—who had to be chaste, over age 50, and dressed as a maiden. She was called the Pythia, maybe because she received her messages from a mystical python, having first drunk from the sacred spring and then gone down to the basement, where she sat on a sacred three-legged stool and chewed on sacred laurel leaves. In her excited state, some of what she said did make sense and some didn't. Priests interpreted in verse.

Other times and places used fiercer stuff than laurel leaves, such as hashish and peyote, and in Peru, the Inca seers drank ayahuasca, a powerful hallucinogen that jolted the central nervous system into oracular mode. At Apollo's temple at the Peloponnesian city of Argos, a chaste woman tasted the blood of a sacrificed lamb and saw the future; at Aegira in Achaia, the priestess drank bull's blood, and in the Philippines, it was pig's blood, which she herself extracted with a dagger. In the Hindu Kush, the sibyl put a cloth over her head and inhaled smoke from the sacred cedar until she twitched all over and fell down prophesying. Often no stimulus at all was required, and the inspired one simply flew into a sacred fit, receiving messages sometimes for days. Oddly enough, prophecy was considered a gift rather than an affliction. In Greek tradition, Apollo gave it to Cassandra in exchange for her amorous favors, but she reneged on her side of the bargain. He paid her back by arranging that nobody would believe her, however loudly she proclaimed Troy's doom. You didn't play games with Apollo.

Consulting oracles was rather like trolling for information on the Internet—you had to frame the question carefully. The Athenian historian Xenophon was invited to go on an ambitious military campaign into Persia, and Socrates told him he should check with Delphi first. So Xenophon went over to Parnassus and asked which gods he should make a sacrifice to in order to make the trip safely. Answers received and sacrifices made, he reported back to Socrates, who was horrified; he should have first asked whether it was a good idea to go at all. It wasn't, and presently Xenophon found himself trapped deep inside the Persian Empire, in charge of 10,000 panicky Greek soldiers, and had to fight his way back through 1,500 miles of enemy territory. The right answer didn't help if you'd asked the wrong question.

Once a month, or at the full moon, the ball is washed, dried and exposed to the moonlight for half an hour.

A simple yes or no answer was safer. At the oracle of Zeus at Dodona, first mentioned by Homer, priests or priestesses interpreted messages from the rustle of the

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sacred oak leaves or perhaps the reverberations of a bronze cauldron, but they also took written questions, scratched on lead tablets, that were returned with "yes" or "no" on the back. Statesmen and generals consulted the oracles on national matters, but the average citizen got answers, too. On two of the surviving lead tablets, one Heracleidas asked if his current wife was going to give him children, and one Cleotas wondered if raising sheep would be a profitable undertaking.

Besides taking direct messages from the gods, seers kept a sharp eye on the omens, observing thunder and lightning, how birds flew and sacred chickens pecked, what the spiders were doing. Omens have survived sturdily into modern times, and many of us still almost believe that a bird flying into the house means a death in the family and a broken mirror brings seven years of bad luck. (There are always more bad omens, as in "ominous," than good ones.) In Egypt, priests watched the numerous temple cats closely because their every move meant something. The expression in their eyes foretold whether the ailing would succumb or survive.

As the monotheistic religions took over, the oracles sacred to individual godlets faded and the hierarchical churches denounced freelance prophecy, except under their own auspices. Their official prophets no longer concerned themselves with individual questions and secular plans. They tackled the big themes.

Untangling Saint John's biblical Revelation is not for amateurs. The novice staggers out of it as from a bad acid trip. He has seen the future, and it contains beasts with six wings apiece, covered all over with eyes. A lamb with seven horns; hail and falling fire mixed with blood. Locusts swarm out of the smoke that rises from a bottomless pit, but they're shaped like horses, with men's faces, lions' teeth, and stings like scorpions. These are followed by horses with fire-breathing lions' heads. Next appears a red dragon with seven crowned heads and ten horns, pursuing a woman who escapes. Later, the ocean becomes like dead-men's blood, and every living thing in it dies. The "cities of the nations" collapse in the worst earthquake in history, the islands flee and the mountains vanish. Then birds get invited to a great supper where they "eat the flesh of kings, the flesh of captains, the flesh of mighty men," and men who have not worshipped the beast come to life and live happily for 1,000 years, to be followed by Judgment Day.

Winston Churchill tried to predict things for a while and then gave up, complaining that the future was just one damned thing after another.

John tells us that all this "must shortly come to pass." Some feel—even hope—it could be any minute now, but most of us would rather wait.

In modern times, the most famous, prolific and long-winded prophet was a French physician calling himself Nostradamus who, in the mid-16th century, wrote more than a thousand mysterious predictions, covering events up to the end of the world in A.D. 7000 (or, some analysts claim, 3797). Basically his messages came directly from God, he said, but he helped them along by holding a forked divining rod over a brass bowl of water, like an antenna. And a fine brew of messages he got, too, full of earthquakes, plagues, famines, nuclear wars, space aliens, the Antichrist and Armageddon, but, like all proper oracles, he needs interpreters and lots of them.

There has never been a shortage of volunteers. In the right hands, Nostradamus can be seen to have foretold the abdication of Edward VIII of England in 1936, the 1974 kidnapping of newspaper heiress Patty Hearst by radicals, the 1979 Iranian hostage crisis, and even that dustup in the Falkland Islands in 1982, which was obviously what he meant by "the great queen . . . shall enter into the port." However, he also foretold the death of Pope John

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"I TOLD MY MOTHER, 'I'M GOING TO THE SOUTH POLE WITH ADMIRAL BYRD!' SHE SAID, 'YOU'LL CATCH YOUR DEATH OF COLD!'"

—MICKEY SPILLANE, on being selected for the Byrd expedition as a young Boy Scout.

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Paul II in 1996 and the election of a French pope.

His inspirations arrived in rhymed quatrains, not always the best way to convey information, but, carefully studied, they yield strange fruit. One scholar finds that he took a surprisingly close interest in World War II, predicting the birth and demise of Hitler, the Nuremberg Trials, the landings at Anzio and Normandy, and MacArthur's return to the Philippines. An odd hobby for the 16th century, but prophets tend to be odd.

Considering that he died in 1566, when the United States was still no more than a bump in the road to the Orient, it's touching how often he thinks of us, even warning us of the poisonous tidal wave that will destroy the tall buildings of Atlantic City at some unspecified date. (He said he could, if he felt like it, give exact dates and times for everything, but that "would not please everybody.") He predicts President Kennedy's assassination quite clearly: What else could he have meant by "Before the people, blood shall be spilt," except maybe a Mike Tyson fight? However, Edward Kennedy will be elected President, as is made plain by his reference to "the great young brother." Nixon and Watergate aren't neglected; obviously Nixon is the "heretical man" who will be condemned by the city because they thought he "had changed their laws," and elsewhere, "the old man . . . deprived of his place" and "his [political] sons eaten before his face." Why, it's Nixon to the very life! The prophet even foresees, more than 400 years in advance, the expulsion of Harrison Williams of New Jersey from the United States Senate in 1982, a truly magnificent feat of premonitory nit-picking.

Our own Nostradamus was Jeane Dixon, Washington real estate agent, astrological columnist and darling of the supermarket tabloids. Her advice was sought, we're told, by Presidents, ambassadors, business tycoons, visiting foreign statesmen and thousands of the lesser faithful. While she may not have been up to the Frenchman's literary standards, she stuck her neck out further and prophesied in plain English. Working by seat-of-the-pants inspiration, fleshed out with a crystal ball and astrology, she foretold President Kennedy's assassination, tried to warn his brother Robert of his own impending doom, and knew years ahead of time that Martin Luther King, Jr., would be murdered. She could pick racehorses, too.

In her 1969 book, *My Life and Prophecies*, she offered us a few flashes on the future. She assured us that by 1970 Fidel Castro, who has been losing power, would be physically removed from Cuba. "I sense he [Castro] feels sudden death lurking around the corner," she claimed. Vice President Spiro Agnew's career would prosper. Because our educational system was tilted too far toward technology and ignored agriculture, America would experience severe food shortages after 1979. And in the mid-1980s a comet slamming into the earth would cause catastrophic earthquakes and tidal waves.

Many of us still almost believe that a bird flying into the house means a death in the family.

Dixon didn't die until 1997, a bad career move. George Orwell had the foresight to be buried 34 years before his dreaded "1984" of totalitarian thought-control misfired. One sees the wisdom of being, like the oracles, inscrutable or, like the gypsies, in a position to pack up and leave town before the future rolls in.

Recently a lot of people who once scorned predictions have taken to wondering anxiously about our immediate future, and whether the turn of the millennium will bring something stranger than computer problems. Even the briefest tour of the subject on the World Wide Web leaves the scroller dizzied by the expected hailstorm of catastrophes, fiends, demons and avenging angels disguised as flying saucers, all coming soon to a world near you. Like children leaning forward to watch the odometer roll up zeros, we brace ourselves for the big change and possible doomsday. (Since many of the world's billion-plus Muslims are counting time from A.D. 622, numberless Jews from 3761 B.C. and more than a billion Chinese from 2637 B.C., doomsday will need to be fairly selective.)

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—BARRY ROSEN, former hostage of the Iran crisis, on his return home to freedom.

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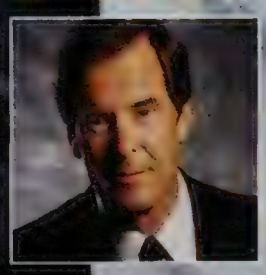

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We used to take a much brighter view. It's a mystery why—surrounded as we are by peace and abundance—we have grown so gloomy, and why our movies about the future never make us want to go live in it. Fifty years ago, we all looked merrily forward to an era of effortless speed and convenience, our every need fulfilled by cheap, clean nuclear energy. And back in 1887, Edward Bellamy's wildly popular book, *Looking Backward, 2,000-1887*, foretold a gentle paradise, untroubled by hunger or conflict; all advanced countries have converted peacefully to socialism, all incomes are equal, and workers retire at 45 with no money worries, because "the nation guarantees the nurture, education and comfortable maintenance of every citizen from the cradle to the grave."

Now, as the mystic date approaches, more of us expect Armageddon than foresee Utopia. It even begins to look as if Bellamy was wrong, but hey, anyone can make a mistake; Karl Marx's inevitable worldwide workers' revolution turned out to be evitable after all, and so did Adolf Hitler's thousand-year Reich. (As for Thomas Malthus, who chillingly predicted in 1798 that rampant population growth would lead to starvation and societal collapse, the jury is still out.)

The year 1999 also is ominous, because the figure turned upside down shows three sixes, said to be Satan's home number, though nobody explains why he didn't turn up in 666 itself. According to Nostradamus, in 1999, in July, "a great king of terror will descend from the skies," and between November 23 and December 21, "the War of Wars will be unleashed." This will happen, according to interpreters, over Manhattan, and bring about either a general doomsday or merely a change of religion. Opinions vary. We may hardly notice the king of terror, though, since we've been engaged in a devastating war with the Antichrist since 1973 and, even at this moment, are wrapping up Armageddon. Some analysts say Nostradamus has two-thirds of us dead of AIDS by 2000, but according to others, our worst plagues will be over by then, though the dead are going to rise from their graves in 2007.

In Jeane Dixon's version, the war and "sudden destruction" don't start until 1999. (This must not be confused with her World War III, which broke out in 1958 over the Chinese islands of Quemoy and Matsu.) As in Nostradamus, oceans and landmasses switch places, with lightning and noises offstage. In 2000, Chinese and Mongol troops invade the Middle East. When Israel emerges victorious, the Israelis recognize it as a miracle and accept Jesus Christ as the Son of God. Then the Dixonian vision sees a blazing cross in the sky, simultaneously visible to the whole world, or at least to the bits that survived the war and floods, and everyone becomes disciples of Christ. Everyone, that is, except the Antichrist, who's still around, somehow.

Nostradamus got a fine brew of messages full of earthquakes, plagues, famines, nuclear wars, space aliens . . .

Well, you never know. Remember Nostradamus got a lucky hit on the Great Fire of London, and maybe the Anzio landing, and Dixon called Kennedy's death. They could be right again. Thousands believe.

At the recent annual conference of the World Economic Forum in Switzerland, two eminent scientists convinced their colleagues that presently robots will be so intelligent they'll take over, and may, if they want, keep humans as pets—R2-D2 training Luke Skywalker to heel and fetch.

Many once-levelheaded people are expecting the next few years to be, at the very least, interesting. If they aren't—if they trudge by with only the usual number of bullying robots, seven-headed dragons, airborne crosses, walking corpses, and kings of terror dropping onto Manhattan—well, it's going to be a terrible letdown.

It won't slow us up, though. We'll just dust ourselves off and start to work on 3000. You can't keep a good prophet down.

Barbara Holland's new book, Wasn't the Grass Greener? A Curmudgeon's Fond Memories, *will be published this spring by Harcourt, Brace. Peter de Sève, of Brooklyn, also designs characters for animation.*

We're looking forward to tomorrow.

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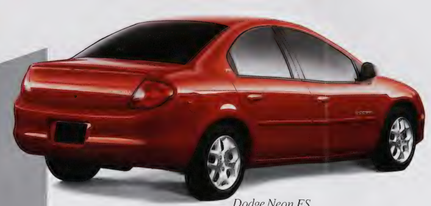

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What is BUGGING Barbara Norfleet?

A photographer's imaginary insect world mirrors our own, with beetles flying kites and six-legged warriors on the march

IF BARBARA NORFLEET HAD BEEN TRAINED AS an entomologist, she probably wouldn't have made these photographs. She has built her career documenting human society, as a photographer and as the founder and director of the Photography Collection at Harvard University and as the curator of photography of Harvard's Carpenter Center for the Visual Arts. Norfleet's latest book, *The Illusion of Orderly Progress* (published this month by Alfred A. Knopf), isn't about insects. "The artist means to tell us something about human nature, particularly its more vainglorious, cowardly, and other foolish manifestations," explains bona fide entomologist Edward O. Wilson in his foreword.

Saturday Night

Ship of Fools

Norfleet's themes are universal: tribal warfare, pride, insecurity coupled with a sincere hopefulness for the future. Who can't relate to the top-of-the-world feeling of two harlequin beetles dancing cheek to cheek (above, left)? But how did Norfleet get her six-legged subjects to pose for the camera? There were many failed experiments. Live insects just wouldn't cooperate, and recently dead cockroaches held too much appeal to the local ant populace, so dried specimens (mostly coleopterans and orthopterans, and mainly from Central and South America) were mail-ordered from long lists of Latin names in an exhaustive catalogue. Exoskeletons ensured that the dried insects arrived in pretty good shape, but their legs and antennae were too brittle to bend into position. To soften them up, the subjects were placed in a makeshift humidor for 24 hours. Then the real work began. Ideas were carefully sketched out, and the insects were arranged into the desired configurations. Lacking a proper studio, Norfleet's worlds came to life on top of a baby grand piano. Wire, glue and tape fastened the fragile creations together, and backdrops of the heavens teetered against wine bottles. The "sky" crashing down on all below was cause for much swearing, so the living room was off-limits until Norfleet was sure she had captured each scene on film. She worked for five years on this project and says "my intent was serious, but as usual humor kept getting in the way." We're grateful that it did. —*Elizabeth J. Erskine*

Am I Pretty?

Frolic

My Tribe Is Better Than Your Tribe

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DOUG M. 58 YEARS OLD. LIVES IN WINNETKA, ILLINOIS WITH WIFE ABBEY. AFTER A SIXTEEN YEAR CAREER AS CORPORATE GENERAL MANAGER OF A MULTINATIONAL FOOD PRODUCTS COMPANY, STARTED HIS OWN SPECIALTY FOODS BUSINESS. THAT WAS FIVE YEARS AGO. COMPANY DID $12M IN SALES IN '98. HE WAS PROFILED IN TWO ENTREPRENEURIAL MAGAZINES. DESPITE A FEW SHREWD TRADES LAST YEAR, DOUG'S EQUITY PORTFOLIO BARELY ECLIPSED THE S&P. RECENTLY STARTED DOING SOME TRADING ON-LINE. SOME DAYS HE FEELS LIKE A VERITABLE WALL STREET GURU. SOME DAYS WONDERS WHAT HE WAS THINKING WHEN HE BOUGHT THAT STOCK. BIG QUESTION ON MIND NOW: WHAT TO DO WITH BONDS THAT ARE MATURING THIS YEAR? AT MOMENT, DOESN'T HAVE A CLUE. ABBEY, WHO OPENED CHILDREN'S CLOTHING STORE IN LOCAL MALL ELEVEN YEARS AGO, IS THE MORE ADVENTUROUS INVESTOR STARTING TO THINK SHE'S A LITTLE TOO FOND OF SMALL COMPANY FUNDS. DOUG HAS SERIOUS AVERSION TO THE WORDS A FEW BROKERS, BUT NEVER REALLY ITH ADVICE HE GOT WHEN HE ROLLED OVER HIS CORPORATE 401(k). HASN'T DONE A REAL IN-DEPTH PORTFOLIO RECENT SUCCESSES, KNOWS IT'S THOUGH STARTING TO FEEL LIKE HE'S PRETTY WELL POSITIONED FOR THE LONG TERM. ABBEY GAVE HIM ARTICLES ABOUT TAX EFFICIENT INVESTING THAT ARE AS GOOD AS ANYONE'S, BUT WHO'S GOT TIME TO DO THE RESEARCH? DAUGHTER JENNIFER, WHO ME SOON. DOUG & ABBEY SOLD HOUSE IN OAK PARK IN '98. MADE TIDY PROFIT, BUT PAID TOO MUCH FOR NG SOME SERIOUS THINKING ABOUT HELPING WITH LONG-TERM CARE COSTS. COULD HAVE USED A LITTLE MORE GROWTH EXPOSURE. THE WAY TO GO FOR COLLEGE FUNDING. COULD ALSO BENEFIT FROM ABBEY'S EXPERTISE YEARS AGO. DON'T THINK DOUG EVER WANTS TO STOP WORKING, BUT ABBEY HAS DIFFERENT IDEAS. FANATICS. DOUG IS IN VERY GOOD HEALTH BUT FINDS THE HOURS "ESTATE PLANNING" TEDIOUS. HE WOULD LOVE TO PLAY, THAT HE'S GOT A MORE NEW CONCEPT. BUT WOULD LOVE TO SEE THAT HE'S GOT A MORE NEW CONCEPT. "TECH STOCK" HE'S WORKED WITH A FEW BROKERS, BUT NEVER REALLY FELT LIKE THEY "CONNECTED." DISAPPOINTED WITH ADVICE HE GOT WHEN HE ROLLED OVER HIS CORPORATE 401(k). HASN'T DONE A REAL IN-DEPTH PORTFOLIO REVIEW SINCE SECOND YEAR OF NEW BUSINESS START-UP. GIVEN HIS

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OUR LOVE AFFAIR WITH LAWNS

IN MOST THINGS HORTICULTURAL, I'VE GOT A green thumb—I've grown thorny grapefruit trees from breakfast seeds, and I once grew an eight-foot potted palm from a coconut. But lawns defeat me. My wife and I spend hundreds of dollars a year on loam, seed, manure, weed treatments, grub poison, lawn-mower tune-ups, professional advice and a pond's worth of municipal water. Still, we can't make our backyard a lush emerald carpet, the kind the Red Sox play on. Our grass looks healthy for a few months, then thins and turns clumpy; by August, the crabgrass alone is thriving. Poring over lawn-care books from the garden center only makes me realize all the steps I'm neglecting. Might our lawn be suffering from a molybdenum deficiency? Should I be using a power dethatcher? Or should I just nuke the whole thing with fluazifop-butyl? (I'm not sure what fluazifop-butyl is, but I'll bet it's hell on crabgrass.)

Frankly, I don't know why I bother. For years, I've read how wrongheaded we all are to waste good drinking water, sully the air with lawn-mower fumes and marinate the soil with petrochemicals just so we can surround our dwellings with an ecological monoculture two inches high, like some kind of free-fire zone. But then I go out and gas up the old rotary mower again.

The devotion that we Americans exhibit toward our lawns, regardless of region, ethnic affiliation or socioeconomic status, borders on the mystical. No other people of the world are quite so obsessed with installing and maintaining expanses of short grass—mostly around houses but also at schools, parks, golf courses, graveyards, freeway embankments and corporate headquarters. Lawns, it must be said, are not the creative pinnacle of the landscaper's art. Lawns aspire to monotony. Front lawns especially are rarely even used for anything. Yet we throw ourselves into tending them or, increasingly, pay someone else to. We spend at least as much on lawn care—estimated to be $30 billion a year—as we do on books, and the outlay keeps growing as our suburbs and exurbs expand and sprout retractable underground sprinklers. Lawns in this country already occupy more land than any other crop, including wheat and corn. If you pushed them all together, you'd have a lawn the size of Pennsylvania. So why do we do it? Why this compulsion to grow grass?

Surprisingly, the American lawn as an esthetic creation is little more than a century old, according to landscape historian Georges Teyssot, a French-born professor of architecture at Princeton University. Teyssot has edited a new book called *The American Lawn*, published by the

AMERICANS TAKE LAWN CARE VERY SERIOUSLY, SPENDING BILLIONS TO KEEP THEIR PERFECTLY CLIPPED GRASS GREEN AND ABSOLUTELY WEED FREE

BY DOUG STEWART

PHOTOGRAPHS BY CAMERON DAVIDSON

Canadian Centre for Architecture and Princeton Architectural Press. (The book is a companion volume to a lavish multimedia exhibition of the same name mounted by the CCA in Montreal last year; the show makes its U.S. debut on April 3 at the Contemporary Arts Center in Cincinnati.)

"The American lawn is actually a hybrid of two landscape traditions, the colonial or vernacular garden and the European aristocratic garden," Teyssot tells me as we sit in sling chairs in his close-cropped backyard in Princeton looking at old illustrations and postcards of lawns that he's collected. The colonial garden was usually a small, rather scruffy area next to the house where vegetables and flowers were grown and chores done. The plots were normally fenced to keep out free-roaming pigs and cattle.

The aristocratic lawn, by contrast, was an impressive sweep of short grass that offered vistas to and from the mansion on a grand estate. It was popularized in 18th-century England by landscape designer Lancelot "Capability" Brown, who earned his nickname from his habit of discussing a site's "capabilities." His can-do attitude involved removing groves of mature trees and sometimes small villages that spoiled his clients' views of "nature." The style was adopted by such New World aristocrats as George Washington and Thomas Jefferson. The expanses were

A grass plug is tested at a Rutgers University research farm.

normally trimmed by servants with scythes, though Washington tried a less labor-intensive solution at Mount Vernon, a resident herd of deer.

With a boom in lawnmower sales following the Civil War, the ordinary suburban lawn quickly became the most recognizable element of the American landscape, Teyssot says. A lawn of short grass was thought to purify the air around a house while doubling as a bucolic visual frame. An early champion of the lawn, Frank J. Scott, had written in 1870: "Whoever spends the early hours of one summer, while the dew spangles the grass, in pushing these grass-cutters over a velvety lawn, breathing the fresh sweetness of the morning air and the perfume of the new mown hay, will never rest contented again in the city." It is a paean to the suburb and its wonder-tool, the push mower.

Teyssot takes me for an impromptu tour of his own suburban neighborhood. We stop at one of Princeton's leafy residential streets, where imposing turn-of-the-century homes, set well back from the street, loom like still lifes on the green tablecloths of their lawns. "This is what the 19th-century theorists approved of," he says as we stroll past lawn after empty lawn. "By putting all these lawns together, without fences, the people on this street created their own park." In doing so, they put themselves and their homes on display to their neighbors and to passersby. "To be pro-lawn in the 19th century was to be public-minded, to be of the people. Everybody could peer in your windows, at least in front. To the upper classes, this openness was unbearable. It was associated with the masses."

Lawn fanaticism is primarily a male trait, for one reason or another.

Teyssot's own front lawn is a tiny patch of ground hidden by hedges, a remnant of his street's origins as an old-style Victorian suburb laid out in 1889, when small hedges with fences were still popular. The hedge, I notice, conceals more weeds than grass. "Yes, the crabgrass got completely out of control this year. I hate it," he says as we examine his ankle-high wilderness. "We were giving all our attention to the flower beds." Though a native of Paris, Teyssot shares his adopted country's devotion to lawn care. All the same, he's delighted to discover a single small dandelion hidden under the hedge. He guesses the plant is a botanical holdover from the 1920s, when a family of working-class Italian immigrants owned his house. They probably grew dandelions and used them as salad greens, as was the custom.

The days of suburban dandelion-farming are long gone: the cult of the lawn is no longer so forgiving. The modern American lawn is as dense, even and fine textured as a green fur coat—or it's supposed to be, to judge from the lawn industry's promotional photographs. Obviously, I'm not the only one whose yard is not a candidate for a seed label. A 1981 poll found that four out of five homeowners were dissatisfied with their lawns, thus demonstrating that the grass *is* greener in the other fellow's yard.

Discontent, of course, is what fuels the whole lawn-care industry. Here in my corner of coastal New England, striving for the perfect lawn is the most socially acceptable of manias. Our electrician's two-acre lawn is such a vivid, eye-popping green that motorists pull over to look at it. Another man I know, a retiree, devotes four to five hours a week to maintaining his own putting green, including thrice-weekly trims with a $2,200 greens mower. "I'd be playing more golf if I wasn't spending so much time trying to keep this in shape," he confides.

Not everyone, naturally, is this committed to lawn care. On a recent weekend afternoon, I stop to talk with a former neighbor of mine, 78-year-old Daniel P. Quill, of Newbury, Massachusetts, who's out mowing his front yard. Actually, he's making small dusty piles of dead crabgrass his daughter pulled up a few weeks before. "I told her, 'Patty, don't pull it up. It's the only lawn I've got.'" He's thought of artificial turf, but it's too expensive. Still, despite his lawn's shortcomings, he admits he doesn't really mind mowing. Before he retired, if he'd had a bad day at the office, he'd come home and mow the lawn. "It was therapy," he says. "People couldn't hear me cursing above the sound of the mower." Quill recalls an old friend years ago who finished mowing his lawn and dropped dead of a heart attack. That's really not such a bad way to go, he reflects. "It could be a hell of a lot worse, couldn't it?" If he had a choice, though, he'd prefer to keel over in the backyard, not in front. "I wouldn't want to be lying out here

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in front of everybody," he says, putting his finger on an unanticipated drawback of the open-style front lawn.

Around here, I've never known anyone more devoted to his lawn (and lawn fanaticism is primarily a male trait, for one reason or another) than Paul Thober, of Ipswich, Massachusetts. Thober, a 43-year-old restaurateur, fitness buff and all-around workaholic, tends an acre or so of rolling lawn radiating out from his small white house. It's not a fussy lawn. He tolerates clover and a few violets, and bark-mulch beds surround several boulders, an archery range, pieces of antique farm equipment and a pair of giant pumpkins whose vines he's laid out in ornamental curves.

When I drop by to watch how a true lawn devotee operates, Thober throws his 48-inch, ten-horsepower, triple-bladed, self-propelled, walk-behind rotary mower into idle. "I have three sets of blades, which I rotate during the year," he tells me. "That way you're cutting the grass, you're not ripping it." Thober has the man who sharpens knives for his seafood restaurant hone all nine mower blades in the winter. His arsenal of lawn-care paraphernalia includes an enormous eight-horsepower leaf blower and a gas-powered aerator that punctures the ground with 30 hollow metal spikes. Many of the tools appear brand-new, but only because he uses his own pressure cleaner to wash them at the end of each season.

Thober estimates he spends eight hours a week on lawn care and landscaping. "When you landscape something nicely, it adds to the value of your property," he says. "I spend maybe $200 a year just on lawn fertilizer, which might seem high to some people, but that's nothing compared to the cost of a new bathroom. And you're still allowed to do it without a license." All the same, I suspect Thober would work just as hard even if no one else noticed the result. "There's something about grass," he says. "It ties everything together, the shrubs and flower beds, the way a carpet brings together the furniture and walls in a room." His lawn also pleases him at a more visceral level. "It's beautiful the way the ocean is beautiful," he says as we stand on his patio, taking it all in. "You look out at it, and you feel at peace."

Some evolutionary psychologists suggest that the pleasure lawns gives us is genetically encoded. Our earliest ancestors were adapted to life in the grassy savanna of East Africa, where predators and prey alike were visible at a distance. Today's humans may have inherited a vestige of this habitat preference, the argument goes, hence our attraction to golf courses and sit-down mowers. I try out this theory on my neighbors. "So through natural selection the people who had lawns survived?" says one, a retired chemist who spends large chunks of his weekends mowing and edging. "I think that's really reaching."

The grass in today's lawns has evolved over time, too, but no longer by natural selection. The grass seed for sale

Paul Thober, of Ipswich, Massachusetts, is surrounded by tools for his lawn.

Who can do more than ever thought possible? "I can."

The "I CAN" program is an ingenious way to educate and motivate kids who may have thought, "I can't." Nancy Barnett helps her special needs students create and sell a wide range of craft items such as paperweights, stationery and placemats which are available in the "I CAN" shop in their high school.

The most rewarding part of the program for the students is when they fill laundry baskets with a selection of housewarming gifts they've made and personally deliver them to new Habitat for Humanity homeowners. After years of receiving the generosity of others, these kids are now experiencing the joy of giving themselves.

For teaching her special needs students the power of "I CAN," State Farm is pleased to present Ms. Nancy Barnett with our Good Neighbor Award and to donate $5,000 to Southside High School in Muncie, Indiana. What other teacher could do so much with two little words?

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at garden shops is a sophisticated industrial product, as painstakingly engineered and rigorously tested as the latest luxury sedan. Scientists questing for greener grass are considering adding genes to grass plants from star moss (better drought resistance) and from tobacco leaves (better at fighting disease, oddly enough), but most hybrids are made the old-fashioned way, by letting plants grow tall and blossom, then crossing one with another. More than 600 new turfgrass varieties are currently being tested around the country. A promising strain stands to earn a healthy slice of the more than three-quarters of a billion dollars that Americans spend annually on grass seed alone.

Most lawn grasses come from the cool, wet northern latitudes of Europe.

Hoping for a tip on a no-water, no-bug, no-mow variety that I might buy at a special introductory price, I pay a visit to Rutgers University's research farm at Adelphia, New Jersey. Many of the popular cool-season lawn grasses of the past 35 years were bred here. On the day I visit, the farm's 205 acres appear tranquil and orderly, a respite from all the traffic on surrounding roads. But up close, I learn, a gruesome ground war is under way, a raw Darwinian struggle, as fungi attack defenseless foliage, beetle larvae suck the lifeblood from tender roots, crabgrass invades neighboring turf by stealth, and wind-borne weed spores parachute into enemy territory and dig in for combat.

Research scientist Karen Plumley greets me. "We had an outbreak of brown patch a few days ago. Friday, it was really at its peak. It was spectacular." She's evidently sorry I missed it. Plumley is the wife of a golf-course superintendent, but as a pathologist the sight of dying grass quickens her pulse.

Plumley's boss is Bill Meyer, a barrel-chested man in aviator sunglasses and a baseball cap who heads the turfgrass breeding program at Rutgers' impressively named Center for Interdisciplinary Studies in Turfgrass Science. "There are 45,000 test plots here," he says as he takes me for a golf-cart tour of the front. "We rate each plot at least once a month for things like color, disease resistance, heat tolerance and growth rate." Fast growth gets low marks, by the way. "The one thing everybody wants is a grass they won't have to mow." The test plots are mowed regularly, but otherwise they're exposed to the droughts, ice storms, contagions and blights of central New Jersey.

Some of the plots get special abuse. Meyer steps over to a farm shed housing a machine he devised to simulate the stress of heavy foot traffic. He emerges driving a street sweeper, its roller bristling with 72 rubber paddles instead of a brush. With a deafening *whup-whup-whup*, Meyer steers his turf-slapper onto a row of test plots. The twirling paddles send bits of shredded grass flying in all directions.

Varieties that stand up to all this are crossed with one another at random and their progeny retested. New grasses have old ancestors, of course. Many of the latter were plugs of grass dug from old lawns, parks, cemeteries and golf courses in and around New Jersey. (Even the oldest of these strains are of immigrant stock, however. Most lawn grasses, even Kentucky bluegrass, come from the cool, wet northern latitudes of Europe. That's why unwatered lawns in the United States tend to burn up in the summer: they'd rather be in Newfoundland.) "A lot of golf courses around here are more than 100 years old," Meyer says, "so we visit the oldest ones and look for individual plants that

In Milwaukee, Wisconsin, meadow gardener Mary E. Berry tends her wildflowers as her lawn-loving neighbors mow.

are so aggressive that they've squeezed out all the plants around them over the past 80 or 100 years." A century of mowing—or grazing, for that matter—means a grass plant never blossoms; propagation is limited to a steady, ground-level creep. In some species of grass, a single plant with good genes can slowly colonize a widening patch of turf year after year. It's survival of the fittest, carried on while the golfers play through.

Meyer has traveled the world collecting grass plugs from old pastures and parks. In September, he flew to Inner Mongolia to pluck grass from 3,000-year-old sheep pastures. Meyer is that rare individual who really does get excited watching grass grow. One variety whose tests he's following intently comes from a clump of bluegrass he found in the Polish city of Poznan two years ago.

"It was an immense, beautiful park that was mowed with scythes," he says. "There were dandelions everywhere except in this one circle 35 feet in diameter. In the whole patch, there was just one dandelion!" Meyer realized at once the grass in the circle had probably come from a single seed, possibly centuries earlier, and had overgrown everything around it. He dropped to his knees, pulled out his combination pocketknife and money clip, and began digging. After racing back to his hotel with the sample, he returned with a camera to take snapshots of the site. With perennial grasses, testing takes years, so Meyer is not about to promise me the grass in my lawn will soon have Polish dandelion-inhibitor genes bred into it, but we both have our fingers crossed.

For me, the most dazzling example of turf science at work is a major league baseball field, especially when you arrive in the stands for a night game and behold a billion

Mark McGwire hit his 64th home run at Milwaukee County Stadium against the perfect green backdrop designed by Dave Mellor.

identical blades of Kentucky bluegrass glowing under the lights. To experience the ultimate lawn up close, I decide to visit Milwaukee County Stadium, home park of the Milwaukee Brewers. "Sports turf management is much more of a science now than it used to be," says Dave Mellor, assistant director of grounds, as I wander around the outfield with him on a recent afternoon. "We can't afford to have million-dollar athletes get hurt because the turf gave way or a ball took a bad hop." The seasonal crew of 35 that Mellor and his boss, Gary Vanden Berg, oversee has to ensure the grass is pool-table smooth—thus safe—all season, despite baseball cleats, tobacco juice, diving catches, rain delays and occasional melees in the infield.

I learn right away one reason my lawn doesn't look like this: I don't mow it every morning, the way the grounds crew here does during Brewers home stands. I look in vain for a clipping longer than half an inch. Reason No. 2: when huge puddles make footing treacherous in my backyard, I don't call in a helicopter to hover overhead for four hours to help dry them out.

Mellor, who studied turf science as an agriculture major at Ohio State University, is an outgoing 35-year-old with an encyclopedic knowledge of how grass grows. He's clearly a sports-turf fanatic. He claims he can identify most major league parks just by seeing their infields on TV. Grounds crews of many stadiums now engage in an unstated competition over which ballpark has the handsomest mowing patterns. (Where a lawn mower's rollers bend grass away from you, it appears as a light stripe, especially under lights; grass bent toward you looks dark.) Mellor is the acknowledged master of the art. Using a tape measure, stakes and string, he's created a gallery's worth of turf art. In his bunkerlike office below the stands, he shows me photographs he's taken of his work—plaids, starbursts, diamonds, pizza slices, bull's-eyes. "This one with the wavy lines was actually a pattern my daughter drew with crayons one night. She said, 'Could you do this one tomorrow, Dad?'" He did indeed. If the calls and letters Mellor receives asking for tips are any indication, competitive lawn-sculpting is poised to become the hot new trend in suburban one-upmanship.

Toward game time, I scout the $2\frac{1}{2}$-acre field on my own, looking for dandelions—Mellor has offered to buy me dinner if I find one. Failing to find any weeds at all, I start to wonder how many tons of weed killer must saturate the ground under my sneakers. Later, I ask Mellor for a num-

ber. "We haven't used herbicide here in four seasons," he says. "When grass is this thick and growing this vigorously, weeds have trouble getting a foothold." Yes, he insists, even if an eco-terrorist smuggles a ripe dandelion into the stands and blows the seeds onto the field.

Of course, if a weed did pop up somewhere, Mellor—unlike you or me—has 35 people who are prepared to dig out every one of its hairy little roots. I'm not sure professional turf management has much relevance to my own lawn's problems. I need a different approach. In Milwaukee, as it happens, examples are not hard to find. The greater Milwaukee area, especially its prosperous North Shore suburbs along Lake Michigan, is the epicenter of the national meadow-gardening movement. The sound of weekend power mowing still dominates the residential streets, but here and there nonconforming residents have given over pieces of their lawns to landscaped islands, strips, or whole exuberant meadows of wildflowers and tall, waving prairie grasses.

"This is my own little canvas to paint on," Mary E. Berry tells me when I pull over next to her modest home on a well-tended boulevard a few miles from downtown. Her front yard is tiny, barely wider than her house, with conventional lawns squeezing it on either side. What her yard lacks in surface area, however, it makes up for in height. There are cup flowers, black-eyed Susans, other coneflowers, monkshood, highbush cranberries. Many of her open-woodland plants reach well over my head. "When I started, I kept things nicely trimmed so people didn't think I was just letting weeds grow," says Berry. Her husband didn't always share her enthusiasm about the ascending tangle out front. "He felt as if something had been taken away from him when he couldn't come out and mow the lawn anymore."

Berry is a rather scrappy environmentalist who, when asked her age (67), adds, "I was born on Earth Day," and she has nothing good to say about the cultivation of short grass. Looking at the houses up and down her street, she says, "Sure, they have lawns, but do they have birds? Do they have dragonflies? Do they have butterflies? Do they have any kind of movement or color?" Her own lot hosts a menagerie of bird and insect life. The mosquitoes in particular enjoy her yard, so much that we make only brief forays into the vegetation before retreating to the sidewalk to talk about it.

Using a tape measure, stakes and string, Mellor has created a gallery's worth of turf art.

Unfortunately, meadow gardening in many communities is not for the timid or the irresolute. Aside from friction with neighbors, there are weed laws to contend with. A man in New York State faced fines that escalated to $30,000 for refusing to cut down the meadow in his yard; the final sum on appeal was a still-hefty $500. An artist in Chicago had better luck by arguing that his wild garden was a form of free expression protected by the First Amendment. Lately, municipal weed laws have been losing their punch, what with the Clinton Administration coming out in favor of native plants and natural landscaping around federal buildings. Lorrie Otto, who founded the Wild Ones, a nationwide natural-landscaping support group, says, "Sometimes I'm surprised that people still grow lawns at all, in the same way that I'm surprised now when I see people smoke."

If my own devotion to herbiculture begins to flag, it won't be for purely ecological reasons. Growing grass is an uphill battle. Like boat building for people who lay keels in their backyards with no intention of going to sea, lawn care is a journey. Many lawn enthusiasts simply like to putter around in the dirt with hand tools. If it was easy to grow grass, it wouldn't be worth the obsession. As for me, maybe my ancestors lived in trees, not savanna, because I'm not sure I have the right genetic makeup for all this yard work.

Mellor mows a precise stripe to finish his design.

Doug Stewart, a regular contributor, wrote about swing dancing in the last issue. Cameron Davidson has photographed 15 stories for the magazine.

Brooklynite Bradford Reed's Pencilina has strings and bells, but no whistles—yet

WACKY INSTRUMENTS OFTEN RESEMBLE BAD PLUMBING, BUT ALL ARE WELCOME IN THE ECLECTIC LIGHT ORCHESTRA OF EXPERIMENTAL MUSIC

CONCERTO FOR PENCILINA AND SEWER FLUTE

ONE AFTERNOON LATE IN THIS NOISY CENTURY, Ken Butler was rummaging through his basement in Portland, Oregon. Amidst the assorted junk, he found a most unlikely musical instrument. It was an axe, rusty and dull. If it talked, the old tool might have told a tale. But did it have a song inside? What would an axe with strings sound like? Butler wondered. Would it whine? Hum? Mimic its cousin, pianist Emanuel Ax? Or would it just hack at wooden ears? Butler, a sculptor and painter, was also a fan of rock and the blues. He knew that many guitarists called their instruments "my axe," so just for fun, he decided to let a real axe call the tune.

Thumbing his nose at eons of musical history, Butler scrounged up a violin's spare parts. He glued on a fingerboard, attached a bridge, strings and tuning pegs to the axe, clipped on an electric guitar pickup and plugged it into his amp. He raised his bow. The axe, silent since the Stone Age, made its musical debut. Its song was surprisingly like a violin's, but more tinny and metallic. You were expecting, maybe, Stradivarius? Still, Butler's instrument was certainly on the cutting edge of modern musical invention.

Twenty years later, not a single composer has written a concerto for Axe-Violin. Nonetheless, Butler's mutant instrument is a proud member of an eclectic light orchestra. Listen! The halls are alive with the sound of hardware. In workshops and studios across the country, mad musical inventors are tuning up. The conductor taps his baton. Butler, first Axe-Violin, plays the opening strains. In the horn section, the Car Horn Organ harmonizes the beeps of Fords and Fiats, while in the strings, players pluck two-story harplike contrivances and Diddley Bows. Percussionists keep time by pounding on flow-

BY BRUCE WATSON

PHOTOGRAPHS BY THEO WESTENBERGER

His mother's old dress form, a flashlight, a sled—each inspired Ken Butler. When bowed, the 45 rpm record on his Push Broom Cello makes a screeching sound; the bristles can be bowed, plucked or scraped.

erpots, bedpans and, of course, the kitchen sink. After opening with the Goldberg Variations—that's Rube, not Bach—the program turns to pieces played on paraphernalia that frequently resemble bad plumbing.

You won't hear these instruments at the philharmonic anytime soon. Not even jazz musicians are ready for Reed Ghazala's Photon Clarinet, two light sensors connected to a box filled with short-circuited wiring. And the Balloon Kit, played by rubbing, pinching and squeezing an ensemble of balloons, may not be your idea of a little night music. Yet for today's sound sculptors, the proof of music is in putting it together, often with nuts and bolts. They are using new instruments to make music that can be merely weird but is more often whimsical and even mystifying.

SUCH EXPERIMENTING IS AS OLD as music itself. Imagine any object that can be twanged, tooted, bashed or bowed, and someone, somewhere, sometime, has tried to play it. From brass behemoths and woodwinds with Germanic names—flugelhorn, hellhorn and heckelphone—to delicate stringed things that look like twisted looms, musical inventions abound in eccentricity. All of today's common instruments were once bold experiments. Those that resonated with the human ear survived; others became the dodoes of music history. Consider the glass harmonica, invented by a man better known for other deeds.

Late one night in colonial Philadelphia, Deborah Franklin awoke to the sweetest music she had ever heard. Sitting up in the darkness, she felt she had died and gone to heaven, there to be serenaded by angels. But it was just her husband, Ben, jamming on his latest contraption. Diners have long known that the rim of a crystal wine glass hums sweetly when

One night in Philadelphia, Deborah Franklin awoke to the sweetest music she had ever heard. Heavenly music. But it was just her husband, Ben, jamming on his glass harmonica.

rubbed by a wet finger. Franklin's glass harmonica produced an array of such notes, which he described as "incomparably sweet beyond those of any other." He mounted 37 glass bowls on a spindle spun by pumping a treadle. Wet fingers placed on the revolving glass played three octaves of notes. Franklin invented the instrument while in England in 1761, and began playing with it, pumping its treadle and spinning out melodies.

The glass harmonica soon enthralled audiences throughout Europe. Marie Antoinette learned to play one, and Mozart composed an entire Adagio and Rondo for a quintet featuring glass harmonica. Beethoven also wrote for it. But the craze proved as fragile as the instrument itself. By the early 1800s, the glass harmonica had vanished from concert halls. Today, however, glass instruments of various types have made a comeback, at least among New Agers.

Instruments have come and gone and some have remained. One German innovator added a sexy curve to a horn and fashioned a radical new instrument. Seeking a name, he might have called it the "Adolphophone." Fortunately, on his application for a patent (granted in 1846), Adolphe Sax put "Saxophone."

Yet, in the wake of the 1960s' cultural upheavals and technological advances, musical invention has taken a quantum leap. These days, anything that makes sound is a potential instrument. Who needs another variation on a theme when you can play "New York, New York" on car horns?

Like Ben Franklin's wife, Wendy Mae Chambers awoke to inspiring music. One morning in 1983, a distant traffic jam on the Brooklyn-Queens Expressway roused Chambers from sleep. Heard in half-consciousness, the honking resembled a symphony. "It was really quite beautiful," she tells me, "with all sorts of muffled sounds and shifting tones."

Chambers, who studied composition at Columbia University, had already taken several steps into music's twilight zone. She had composed music for vacuum cleaners and once conducted "Real Music for Nine Cars," directing honking vehicles through a parking lot. Each car had its sheet music taped to its rearview mirror. But the expressway elegy steered Chambers' music in a new direction. Soon, she was roaming through junkyards, pitchpipe in hand, to assemble an organ that would make itself heard above the rap and rumble of modern music.

Start spreading the news. Beeep! *I'm leaving today.* Honk, honnnnnk! Chambers' Car Horn Organ features 25 horns tuned by Datsun, Cadillac and Volkswagen. American horns, Chambers notes, are usually tuned to F, A and their respective sharps. Foreign cars are all over the melodic scale. Some horns emit ear-piercing honks, others modest beeps. Chambers wired them all to a pianolike keyboard and hooked the whole contraption to a car battery. *I'll make a brand new start of it—in old New York.* Honnkkk! Ah-oo-gah! Chambers has tooted her own horns in parades, at auto shows, even at the Guggenheim Museum. Audience reaction is predictable, she says. People plug their ears at first. A few smile. Some hurry out of earshot. "A little bit of Car Horn Organ goes a long way," Cham-

New instrument makers regard brass as boring, woodwinds as worn out. Eccentric inventors prefer eccentric materials. Eggshells. PVC pipe. Axes.

bers quickly admits. While she may never play "Flight of the Bumblebee" on car horns, she is honking out a Christmas CD. After it's released, New York, New York, won't be the only city that never sleeps.

Many who make unusual instruments are more than just playful. Classical music is dominated by tradition. Pop is driven by dollars. In defying these establishments, a musical innovator, like a modern artist, needs a manifesto. In the quarterly journal *Experimental Musical Instruments*, inventors make somber statements about how their instrument "isolates and potentiates some acoustical or mechanical property." Shunning whimsy, many serious musicians are making serious music on serious self-made instruments. Yet when a bunch of musical inventors assemble on a single stage, one can be forgiven for cracking a smile.

It was a quiet January day at the New York Stock Exchange in 1998; trading was moderate. Yet when brokers headed home, they were met by a bullish bellowing of experimental instruments. Echoing through the World Financial Center's Winter Garden, the Reinventions Performance Series had brought in five musical inventors to serenade the barons. Chambers was there with her Car Horn Organ. Robert Grawi

When she plays "New York, New York" on her Car Horn Organ, Wendy Mae Chambers gives honky-tonk a whole new meaning.

plucked his Gravikord, a stringed instrument that resembles an upper section of the Brooklyn Bridge but sounds as sweet as several harps played in harmony. Richard Cooke played the Free Notes Gamelan, his quintet of xylophones built of aluminum and wood bars resting on plastic pipe resonators. As the suits sidled past, the musicians honked, thrummed and strummed. A few passersby danced, but most clutched their umbrellas and walked briskly outside into the relative calm of lower Manhattan. Evidently, Wall Street was not the place for such music. In the two days following the concert, the Dow fell more than 300 points. Seems brokers couldn't get the tunes out of their heads.

New instrument makers regard brass as boring, woodwinds as worn out. Eccentric inventors prefer eccentric materials. Eggshells. PVC pipe. Axes. When Ken Butler first played his Axe-Violin, he had no intention of becoming a musician. But when he found his axe, he found a calling. He soon strung more things lying around the house. Toeing the fine line between genius and insanity, Butler put strings on a snow shovel, a toy machine gun, even a golf club. His 3-wood's lone string resonates like a sitar when the club is flexed.

Butler's studio is lined with his instruments, more than 300 in all. An admirer of Cubism and nonsensical Dada art, he considers his creations sculptures as much as music makers. Many are augmented by doorstops, saw blades and hairpins that twang. Butler made his mutants just for fun, but a museum curator spotted them in his studio and offered him a show. One of his pieces is now in the Metropolitan Museum of Art's permanent collection, and he has his own CD, *Voices of Anxious Objects*. Butler's music is surprisingly melodic, with a Middle Eastern flavor. He has performed on MTV and in museums and clubs all over the world. Two decades after picking up his axe, Butler still can't believe it became a career. "People ask me what I do, and I say, 'I make instruments out of toothbrushes and snow shovels and play them live.' And they say, 'Yeah, sure, Ken . . . uh, tell me when you've got a show coming up.'"

BUTLER'S SUCCESS MAY BE BAFfling, yet classical musicians have a word for it: "scherzo," Italian for "joke." Among composers, Beethoven and Haydn were notorious jokers, punctuating their works with sudden, spry moments or humorous effects. But today's inventors are adding the scherzo to instruments themselves. "Some call themselves artists with a capital *A*," says Bart Hopkin, publisher of *Experimental Musical Instruments*. "But a campy self-mockery is a very important part of the process." Hopkin's own instruments are a good example. His Seaweed Horn is made from dried bull kelp. Hold the Seaweed Horn to your ear and you can hear the ocean laughing.

Once you have the manifesto, the material and the mirth, only one question remains—to plug in or not to plug in? The question has bothered musical inventors ever since the Theremin. Perhaps you haven't heard of the Theremin, but you have heard it. You just didn't recognize it as anything from this part of the solar system. It s eerie oooh-weee-ooooo musical-saw-like sounds have accompanied science-fiction films such as *The Day The Earth Stood Still*, the theme to TV's *My Favorite Martian*, and the Beach Boys' classic tune "Good Vibrations." First demonstrated by Russian physicist Leon Theremin in 1920, the Theremin is one of the world's earliest electronic instruments. Its vibrations are produced by high-frequency oscillators, other electronic

gewgaws and loving hands. Two wires protrude from the instrument's switched-on box, one straight, the other looped. Place one hand near the loop to control the volume, and wave your other hand, Zubin Mehta-style, beside the straight wire. The closer your conducting hand comes to the wire, the higher the pitch.

In its heyday, the Theremin was a concert instrument. In 1922, Theremin himself played for Lenin, and he soon went on a series of international tours to demonstrate the new Soviet instrument. Five years later, Theremin played at New York's Carnegie Hall, and in 1929 RCA licensed his invention and began manufacturing it. Soon the Theremin was played by some 700 professional "Thereminists" who made the thing sound like a nightingale warbling hymns to Orpheus, with occasional static. But within a few years, alas, the Theremin was all but forgotten. It was, however, championed by Robert Moog, whose 1964 synthesizer was at first considered a fad but has since become a common fixture in popular music. So, turn on and plug in? Or remain earthbound and acoustic? One inventor, whose music is more inspired than wacky, has it both ways.

He's done scary things to timpani and trombones, but Trimpin's talent is gaining recognition. In 1997, he won a $280,000 MacArthur Fellowship.

ON A HILL NEAR DOWNTOWN Seattle is the laboratory of a symphonic Dr. Frankenstein. The spacious three-story studio is filled with tuneful spare parts. A half-dozen trombones hang in a cluster from the high ceiling. In a corner sits a piano, its keyboard mounted by a monstrous machine capable of playing all its keys at once. Along the walls, cabinets and drawers overflow with wires, circuitboards and switches. And seated in the middle of the lab is its resident wizard, Trimpin. Lean and wiry, with shoulder-length graying hair, he seems the very model of a mad inventor. "I prefer music made by humans," he tells me in an accent betraying his German birth. "I'm not interested in electronic sounds. The computer is only a tool, but the human body has limits—two hands, ten fingers, two lungs. I'm interested in using machines to go beyond what humans can do."

To demonstrate, Trimpin (who refuses to divulge his first name) walks to a laptop computer in one corner, taps a few keys, then hits ‹ENTER›. Suddenly his studio is filled with peals and clicks echoing from all corners in a gorgeous, syncopated rhythm. The sounds, made by chimes and drums wired to Trimpin's computer, swirl around me, resounding now here, now there. Trimpin doesn't so much as smile or nod. He's heard this one before. He spent weeks programming it, and a lifetime preparing.

As a boy, while other musicians were practicing scales in their bedrooms, Trimpin was learning music in the wild. He still remembers the day his father, an amateur on flugelhorn, took him into the woods to play. "I thought it was a silly idea," he says, "but the acoustics were overwhelming." Trimpin absorbed even more musical ambience during a ritual in his hometown near Germany's Black Forest. Each spring, town residents built a huge bonfire on a hill and heated small wooden disks with holes in them. When they launched the disks at the end of sticks into the air, the glowing wheels whistled like a choir. It sure beat playing in an oom-pah-pah band, and the young Trimpin was hooked on "sound sculpture." After studying brass, woodwinds and electrical engineering, he began making his crazy-like-a-fox melodic machines.

IN 1987, HE FLOATED A HUNdred Dutch wooden shoes in a stream outside Maastricht in the Netherlands. He set mallets inside each shoe and wired them to a computer. The shoes, jostled by the water, emitted a flow of glittering music, which Trimpin enhanced with a light-sensitive keyboard played by sun and shadow. He called the composition, appropriately, "Floating Klompen." Trimpin also tinkers on a smaller scale. He has rigged "bow-wheels" to violins, enabling them to be played continuously. He has played cymbals with bows and done scary things to timpani and trombones. But Trimpin's talent is gaining recognition. In 1997, he won a $280,000 MacArthur Fellowship.

This month, the streets in downtown Miami will sing accompaniment to Trimpin's "MIAMI Klangflotte." The Klangflotte (German for "sound fleet") will feature six cycle-rickshaws equipped with drums, horns and other music makers. Riders will maneuver the rickshaws down converging streets at coordinated distances. The performance, while enjoyed by many, will inevitably raise the age-old question often asked about art. A rickshaw clanging along the street may be interesting, but is it music?

"Without music life would be a mistake," Nietzsche observed. But are wacky instruments more mistaken than musical? In a world of gangsta rap and grunge, judgments about music surrender to individual tastes. As to my own measure, I consider a performer's feel for an instrument. Anyone can play the whirly, a flexible

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corrugated plastic tube that emits ethereal tones when whirled overhead. But how many will take the time to learn "Louie, Louie" on one? And who but Australian Sarah Hopkins can conduct an entire orchestra of whirlies? Hopkins' whirly orchestra looks like modern dance and sounds haunting, like monks chanting in a cathedral. On the other hand, there's the Pneumaphone, a set of inflatable pillows hooked by hoses to wind instruments, like whoopee cushions putting on airs. Playing the Pneumaphone takes no feel at all. You sit on it. It toots. But if they laugh when you sit down to play, take heart. In music, there's a grave danger in taking anything too seriously, as P.D.Q. Bach's fans know well.

According to "Professor" Peter Schickele (SMITHSONIAN, February 1990), Johann Sebastian Bach's last and least son, P.D.Q., played a heap

Trimpin hangs out with the horns in his Seattle studio. Behind him is his fantabulous Leonardo's Boom Box.

plane tickets to the town where she was born: $1,200

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of "unusual instruments." In comedic concerts presenting P.D.Q.'s compositions, such as "Concerto for Horn and Hardart" and "Pervertimento for Bagpipes, Bicycle, and Balloons," Schickele plays the Double Reed Hookah in F, the Left-handed Sewer Flute, the Shower Hose in D and the Windbreaker. The latter is made of tuned mailing tubes, leading to its nickname, the "Mailing Tuba." The name, Schickele notes in *The Definitive Biography of P.D.Q. Bach*, "does not . . . account for the instrument's extremely unusual tone quality, about which the less said the better."

CALL ALL OF THIS MUSIC. CALL it madness. Either way, the orchestra must close its concert on a sour note. This swan song comes from the Pencilina. During one really boring summer when Bradford Reed was a New York teenager, some friends built a backyard fence. Reed, taking a stab at immortality, grabbed a fence post, added guitar hardware and stretched six guitar strings a few inches above it. He later put a second board beside the first and added four bass guitar strings. Between each set of strings, the inventor inserted drumsticks to move up and down the neck, sliding the notes somewhat like a bottleneck blues guitarist. Banging with sticks (at first pencils, hence "Pencilina"), bowing, plucking and ringing attached bells, Reed is the world's only maestro of the Pencilina. "A lot of instrument builders are very scientific," the wry, off-the-cuff Reed tells me when I visit him and the Pencilina in their Brooklyn loft. "I just wing it."

Reed plays on Greenwich Village streets, in bands and on self-made CDs like *Bradford Reed: LIVE! At Home*. Though in refining the instrument he admits to becoming more and more methodical, as he stretches notes and thumps a bass drum with his foot the Pencilina sounds like Jimi Hendrix and Buddy Rich playing "Dueling Banjos." "When people ask me what kind of music it is, I say folk," he tells me. "The Pencilina plays elements from every kind of music I've ever heard."

Schickele's comedic concerts feature the Double Reed Hookah in F, the Shower Hose in D and tuned mailing tubes nicknamed the "Mailing Tuba."

Part of Leonardo's Boom Box, a caricature of drag star Divine plays the sax.

Fear not, music lovers. Pencilinas are not about to take their place beside the bassoons. Joining the band is not the point of making your own instrument, explains Bart Hopkin. "Few musical inventors expect to make the next violin," the experimental instrument guru tells me. "Many are musical sculptures, one of a kind. Their makers pursue individual sounds without expecting that someday there will be a pool of players tuning them up in practice rooms."

Whatever you call experimental instruments, they certainly make you hear things you've never heard before. Just as Romantic composers expressed the sounds of nature in their symphonies, the new instruments sound especially intriguing when they echo the world outside. That subway rumble? Doesn't it sound like a Pencilina? That traffic jam? It may not be playing "New York, New York," but it has a familiar honk to it. And pouring a glass of wine, I wet my finger and rub an homage to Ben Franklin and his glass harmonica. Bombarded by noise and clatter, some may yearn for the sounds of silence. Yet for those who keep their ears and minds open, there's "music" everywhere. The sound of music, and the ability to hear it in the slightest sound, is embedded in us.

Avant-garde composer John Cage, notorious for adding unusual noises and even long silences to his compositions, once tried to experience total quiet. He sought out a soundproof chamber and seated himself inside. The doors were closed. At first, Cage heard nothing. Nothing at all. Then gradually he detected two sounds, one high, one low. The sounds continued until Cage left the chamber. An engineer told him that the high sound had come from his nervous system resolutely sending its signals. The low sound was his blood circulating. Sometimes the music *is* us.

Bruce Watson plays guitar, and writes regularly for SMITHSONIAN *on topics ranging from curling to Ferraris. Among other subjects, Theo Westenberger has photographed transgenic animals and tap dancers for these pages.*

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A painter of Angels became the father of Camouflage

Turn-of-the-century artist Abbott Thayer created images of timeless beauty and a radical theory of concealing coloration

BY RICHARD MERYMAN

DOWN THE FULL DISTANCE OF MY MEMORY, A DAUNTINGLY STOUT BOX STOOD ON ITS end in the barn of our Victorian house in Dublin, New Hampshire. In my morbid youthful imagination, maybe it was a child's casket, maybe there was a skeleton inside. My father airily dismissed the contents: just the printing plates for the illustrations in a 1909 book, *Concealing-Coloration in the Animal Kingdom*, the brainchild of Abbott Handerson Thayer, a major turn-of-the-century painter who died in 1921. He was a mentor to my artist father (whose name I bear) and a family icon. He was the reason my father stayed in Dublin: to be near the man he revered.

I was recently visited in Dublin by Susan Hobbs, an art historian researching Thayer. This was the moment to open the box—which now felt to me like an Egyptian sarcophagus, filled with unimagined treasures. And indeed it was! The plates for the book were there—and with them, cutouts of blossoms and butterflies, birds and bushes—lovely vignettes to show how coloration can conceal objects by merging them with their backgrounds. Everything was wrapped in a 1937 Sunday *Boston Globe* and *New York Herald Tribune*.

Also, I held in my hands a startling artifact of military history. Green and brown underbrush was painted on a series of horizontal wooden panels. A string of paper-doll soldiers dappled green and brown could be superimposed on the landscapes to demonstrate how camouflage-design uniforms would blend into the backgrounds. Cutouts and stencils in the shape of soldiers, some hanging from strings, could be placed on the panels as well, to demonstrate degrees of concealment. Here was Abbott Thayer, the father of camouflage.

Nowadays camouflage togs are worn as fashion statements by trendy clotheshorses, and as announcements of machismo by both men and women. The "camo"

In World War I, Thayer created displays to illustrate the application of his theory of concealing coloration to military camouflage. The panel above contrasts the visibility of a "monochrome" soldier, right, with that of a "camouflaged" soldier.

Many of Thayer's works celebrate beauty and purity. A *Virgin* (below), painted for his patron Charles Freer in 1893, sets the artist's children (Mary leading Gerald and Gladys), draped in classical robes, against winglike clouds. The model for *Girl Arranging Her Hair* (above), c. 1918-1919, was Alma Wollerman, Gerald's wife.

pattern is the warrior wardrobe for rebels and rogues of all stripes, and hunters of the birds and animals Thayer studied to the point of near worship. Catalogues and stylish boutiques are devoted to camouflage chic. There are camo duffels, camo vests, even camo bikinis.

This evolution is heavily ironic. A strange and astonishing man, Thayer had consecrated his life to painting "pictures of the highest human soul beauty." He was one of a small group who returned from Paris art schools in the late 1800s with a new vision of American art. They were painters of atmosphere, apostles of timeless beauty, often embodied by depictions of idealized young women. Distinct from the storytelling pre-Raphaelites, the American Impressionists and such muscular Realists as Winslow Homer and Thomas Eakins, the group included Thomas Dewing, Dwight Tryon, George de Forest Brush, the sculptor Augustus Saint-Gaudens, and James McNeill Whistler, who remained abroad. Deemed a "rare genius" by the railroad car magnate Charles Lang Freer, his patron and mentor, Thayer in that era was considered one of the finest figure painters in America.

Thayer's second obsession was nature. An Emersonian transcendentalist, he found in nature an unsullied form of the purity, the spiritual truth and the beauty he sought in his painting. This combination of art and naturalism led him to his then-radical theory of concealing coloration—how animals hide from their predators, and prey. The foundation of military camouflage, it would have been formulated without Thayer and his particular contributions. Types of camouflage had long existed. Brush was used to conceal the marching soldiers in Shakespeare's *Macbeth*, and the headdresses and war paint worn by African warriors, to cite Thayer's own example, served to disrupt their silhouettes. But it was Thayer who, in the early 1890s, began creating a wholly formed doctrine of concealing coloration, worked out through observation and experiment.

The theory emerged from the total mingling of his art and his nature studies. Thayer once explained to William James, Jr.—son of the famed philosopher and a devoted disciple of Thayer's—that concealing coloration was his "second child." This child, said Thayer, "has hold of one of my hands and my painting has hold of the other. When little C.C. hangs back, I *can not* go forward. . . . He *is* my color-study. In birds' costumes I am doing all my perceiving about the color I now get into my canvases."

Thayer believed that only an artist could have originated this theory. "The whole basis of picture making," he said, "consists in contrasting against its background every object in the picture." He also was a preeminent technician in paint, the acknowledged American master of the color theories developed in Munich and Paris—theories of hue

NATIONAL MUSEUM OF AMERICAN ART; FREER GALLERY OF ART, SI; P.117 JOHN TSANTES (PHOTO)

Thayer artfully rendered the ethereal winged figure of his *Stevenson Memorial* (1903) in a very human pose. The work was painted as a tribute to author Robert Louis Stevenson.

and chroma, of color values and intensities, of how colors enhance or cancel one another when juxtaposed.

Thayer based his concept on his perceptions of the ways in which nature "obliterates" contrast. One is by blending. The colorations of birds, mammals, insects and reptiles, he said, mimic the creatures' environments. The second is by disruption. Strong arbitrary patterns of color flatten contours and break up outlines, so denizens either disappear or look to be something other than what they are.

Contours are further confused, Thayer maintained, by

NATIONAL MUSEUM OF AMERICAN ART, SI

the flattening effect of what he termed "countershading": the upper areas of animals tend to be darker than their shadowed undersides. Thus the overall tone is equalized. "Animals are painted by Nature darkest on those parts which tend to be most lighted by the sky's light, and *vice versa*," wrote Thayer. "The result is that their gradation of light-and-shade, by which opaque solid objects manifest themselves to the eye, is effaced at every point, and the spectator seems to see right through the space really occupied by an opaque animal."

To demonstrate the effects of countershading, he made small painted birds. One rainy day in 1896 he led Frank Chapman, a curator at the American Museum of Natural History in New York, to a construction site. At a distance of 20 feet, he asked how many model birds Chapman saw in the mud. "Two," Chapman said. They advanced closer. Still two. Standing practically on top of the models, Chapman discovered four. The first two were entirely earth brown. The "invisible" two were countershaded, with their upper halves painted brown and their lower halves painted pure white.

Thayer contended that even brilliantly plumaged birds like the peacock can blend into, and thus be camouflaged by, their habitats. To illustrate his theory, he and his young assistant Richard Meryman painted *Peacock in the Woods* for Thayer's coloration book.

Thayer held demonstrations of his theory throughout the East. But while many prominent zoologists were receptive to his ideas, numerous other scientists acrimoniously attacked him. They argued correctly that conspicuous coloring was also designed to warn off a predator or attract a perspective mate. In particular, they resented Thayer's insistence that his theory be accepted all or nothing—like Holy Scripture.

His most famous detractor was big-game-hunting Teddy Roosevelt, who publicly scoffed at Thayer's thesis that the blue jay is colored so as to disappear against the blue shadows of winter snows (page 122). What about summer? Roosevelt asked. From his own experience, he knew that zebras and giraffes were clearly visible in the veld from miles away. "If you . . . sincerely desire to get at the truth," wrote Roosevelt in a letter, "you would realize that your position is literally nonsensical." Thayer's law of obliterative countershading did not recieve official acceptance until 1940, when a prominent British naturalist, Hugh B. Cott, published *Adaptive Coloration in Animals.*

Although concealing coloration, countershading and camouflage are now axiomatically understood, at the end of the 19th century it probably took an eccentric fanatic like Thayer—a freethinker antagonistic to all conventions, a man eminent in a separate field—to break with the rigid mind-set of the naturalist establishment.

Born in 1849, Thayer grew up in Keene, New Hampshire. At age 6, the future artist was already "bird crazy," as he put it—already collecting skins. Attending a prep school in Boston, he studied with an animal painter and had begun selling paintings of birds and animals when at 19 he arrived at the National Academy of Design in New York.

NATIONAL MUSEUM OF AMERICAN ART, SI

There Thayer met his feminine ideal, an innocent soul—poetic, graceful, fond of philosophic reading and discussion. Her name was Kate Bloede. They were married in 1875, and at age 26, Thayer put aside his naturalist self and sailed for Paris to begin four years of study at the Ecole des Beaux-Arts under Jean-Léon Gérôme, a great master of composition and the human figure.

When they returned to America, Thayer supported his family by doing commissioned portraits. By 1886 he and Kate had three children, Mary, Gladys and Gerald. Brilliant, isolated, ascetic, hyperintense, an almost pure example of late-19th-century romantic idealism, Thayer epitomized the popular image of a genius. His mind would race at full throttle in a rush of philosophies and certainties. His joy was exploring the imponderables of life, and he scrawled passionate, barely readable letters, his second thoughts routinely continued in a series of postscripts.

Impractical, erratic, improvident, Thayer described himself as "a jumper from extreme to extreme." He confessed to his father that his brain only "takes care of itself for my main function, painting." Later he would compose letters to Freer in his head and then be surprised that his patron had not actually received them. Though Thayer earned a fortune, selling paintings for as much as $10,000, an enormous sum in those days, money was often a problem. With wheedling charm he would pester Freer for loans and advance payments.

Thayer cut a singular figure. A smallish man, 5 feet 7 inches tall, lean and muscular, he moved with a quick vitality. His narrow, bony face, with its mustache and aquiline nose, was topped by a broad forehead permanently furrowed by frown lines from concentration. He began the winter in long woolen underwear, and as the weather warmed, he gradually cut off the legs till by summer he had shorts. Winter and summer he wore knickers, knee-high leather boots and a paint-splotched Norfolk jacket.

After moving the family from place to place, in 1901 Thayer settled permanently, 13 miles from Keene, in Dublin, New Hampshire, just below the great granite bowl of Mount Monadnock. His Thoreauesque communion with nature permeated the entire household. Wild animals—owls, rabbits, woodchucks, weasels—roamed the house at will. There were pet prairie dogs named Napoleon and Josephine, a red, blue and yellow macaw, and spider monkeys that regularly escaped from their cages. In the living room stood a stuffed peacock, probably used as a model for a painting (opposite) in the protective coloration book. A stuffed downy woodpecker, which in certain lights disappeared into its artfully arranged background of black winter twigs and branches, held court in the little library.

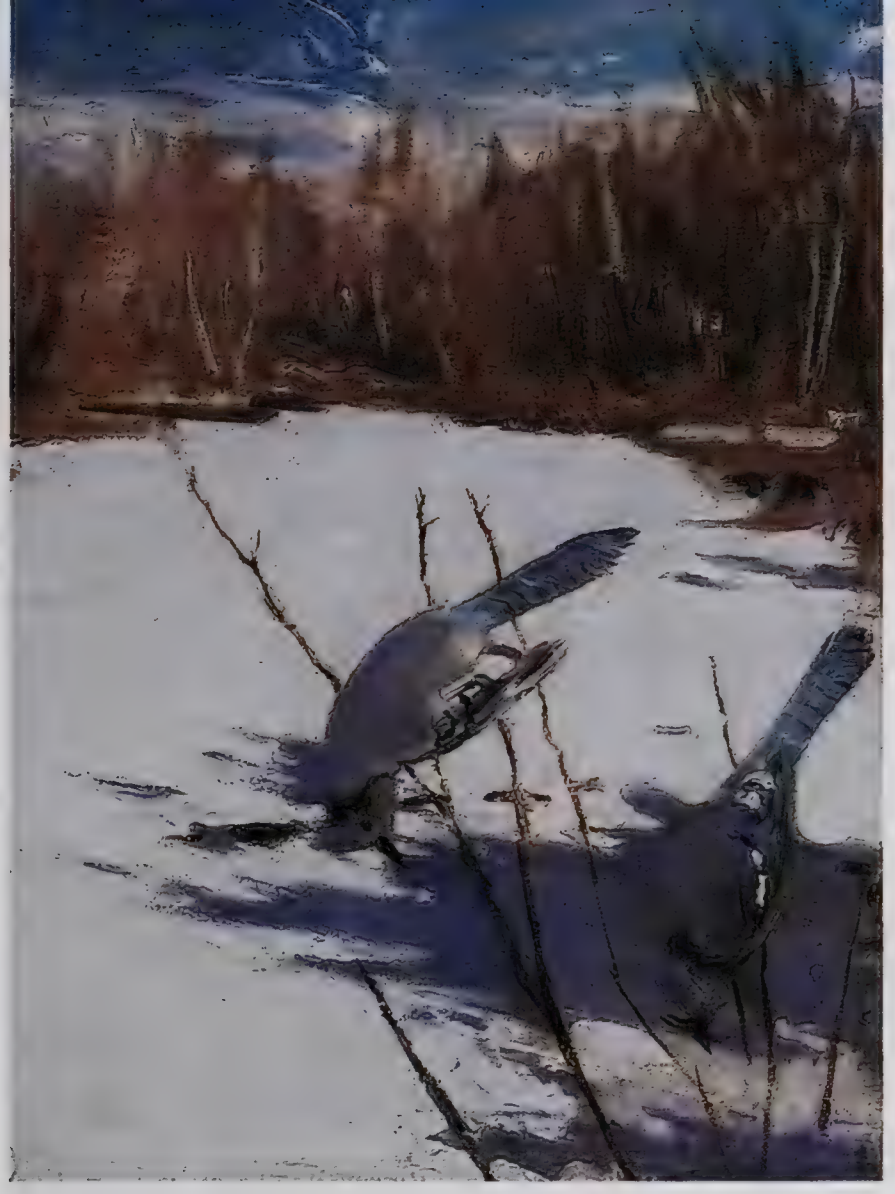
The artist Rockwell Kent, a student of Thayer's, worked with the painter, his wife Emma and son Gerald to create the compelling watercolor illustration *Copperhead Snake on Dead Leaves*.

The same artwork is shown above as it appears in Thayer's book, with a stencil overlay that masks out everything but the snake, thus revealing the otherwise cleverly camouflaged reptile.

Promoting to ornithologists his theory of protective coloration, Thayer met a young man who immediately was adopted as an honorary son. His name was Louis Agassiz Fuertes, and though he would become a famous painter of birds, he began as an affectionate disciple.

Both men were fascinated with birds. They regularly exchanged skins and Fuertes joined Thayer on birding expeditions. He spent a summer and two winters with the family, joining in their high intellectual and spiritual arguments—the exact interpretation of the Icelandic Sagas—and their rushes to the dictionary or relief globe to settle questions of etymology and geography. On regular walks in the woods, Fuertes summoned birds by whistling their calls—like Thayer, who stood on the summit of Mount

NATIONAL MUSEUM OF AMERICAN ART, SI; JOHN TSANTES FROM: ABBOTT H. THAYER



Thayer painted *Blue Jays in Winter* to demonstrate his claim that the colors of the blue jay's feathers blend with shades of sunlit snow, shadows and branches to help conceal and protect the bird.

Monadnock in the twilight and attracted great horned owls by making a sucking sound on the back of his hand. One owl, it is said, perched on top of his bald head.

Fuertes also served as a tutor to Gerald. Thayer's children were not sent to school. He needed their daily companionship, he said, and feared the germs they might pick up. He thought the purity of their youth would be corrupted by a confining, formal education. The children were well taught at home, not the least by Thayer's lofty environment of music and books. Mary grew up to be an expert linguist. Gladys became a gifted painter and a fine writer. Gerald, also an artist, was to be the author of record of *Concealing-Coloration in the Animal Kingdom*.

The Dublin house had been given to the Thayer family by Mary Amory Greene. A direct descendent of the painter John Singleton Copley, Greene had been one of Thayer's students. She made herself Thayer's helper, handling correspondence, collecting fees—and writing substantial checks. She was one of several genteel, affluent, single females delighted to dedicate themselves to the artist. He once explained, "A creative genius uses all his companions. . . passing to each some rope or something to handle at his fire, i.e. his painting or his poem."

Another savior was Miss Emmeline "Emma" Beach. A tiny sprite of a woman with reddish-gold hair, she was gentle, understanding, selfless, but also efficient, effectual, and moneyed. Her father owned the *New York Sun*. Kate was as disorganized as her husband, so both embraced Emma's friendship. She cheerfully became the Thayer family factotum, struggling to bring order to the chaos.

In 1888 Kate's mind folded into melancholia and she entered a sanatorium. Alone with the three children, blaming himself for causing Kate's "dark state," Thayer turned more and more to Emma. He wrote her wooing, confiding letters, calling her his "Dear fairy godmother" and imploring her to come for extended visits. When Kate died of a lung infection in 1891 in the sanatorium, Thayer proposed to Emma by mail, including the plea that Kate had wished her to care for the children. They were married four months after Kate's death, and it was with Emma that Thayer settled year-round in Dublin. Now it fell to her to keep the fragile artist glued together.

This was a considerable challenge. His life was blighted by what he called "the Abbott pendulum." There were highs of blissful "all-wellity" when he reveled in "such tranquility, such purity of nature and such dreams of painting." At these times he was his essential self—a man of ingratiating charm and grace and generosity. But then depressions set in. "My sight turns inward," he wrote, "and I have such a state of sick disgust at myself. . . . "

He suffered from "oceans of hypochondria," which he blamed on his mother, and from an "irritability" he claimed to inherit from his father. Harassed by sleeplessness, exhaustion and anxiety, by petty illnesses, bad eyes and headaches, he kept his state of health, excellent or terrible, constantly in the foreground.

He was convinced that fresh mountain air was the best medicine for everyone, and the entire family slept under bearskin rugs in outdoor lean-tos—even in 30-below weather. In the main house, windows were kept open winter and summer. The place had never been winterized, and what heat there was came from fireplaces and small wood-burning stoves. Illumination was provided by kerosene lamps and candles. Until a water tower fed by a windmill was built, the only plumbing was a hand pump in the kitchen. A privy stood behind the house. But there was always the luxury of a cook and house maids, one of whom, Bessie Price, Thayer used as a model.

In 1887 Thayer found the leitmotif for his most important painting. Defining art as "a no-man's land of immortal beauty where every step leads to God," the forefather of today's raucous camouflage painted his 11-year-old daughter Mary as the personification of virginal, spiritual beauty, giving her a pair of wings and calling the canvas *Angel*. This was the first in a gallery of chaste, lovely young women, usually winged, but human nevertheless. Although Thayer sometimes added halos, these were not paintings of angels. The wings, he said, were only there to create "an exalted atmosphere"—to make the maidens timeless.

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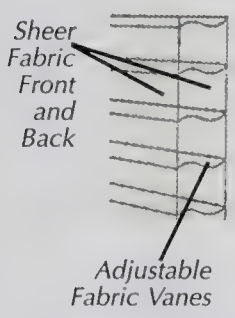

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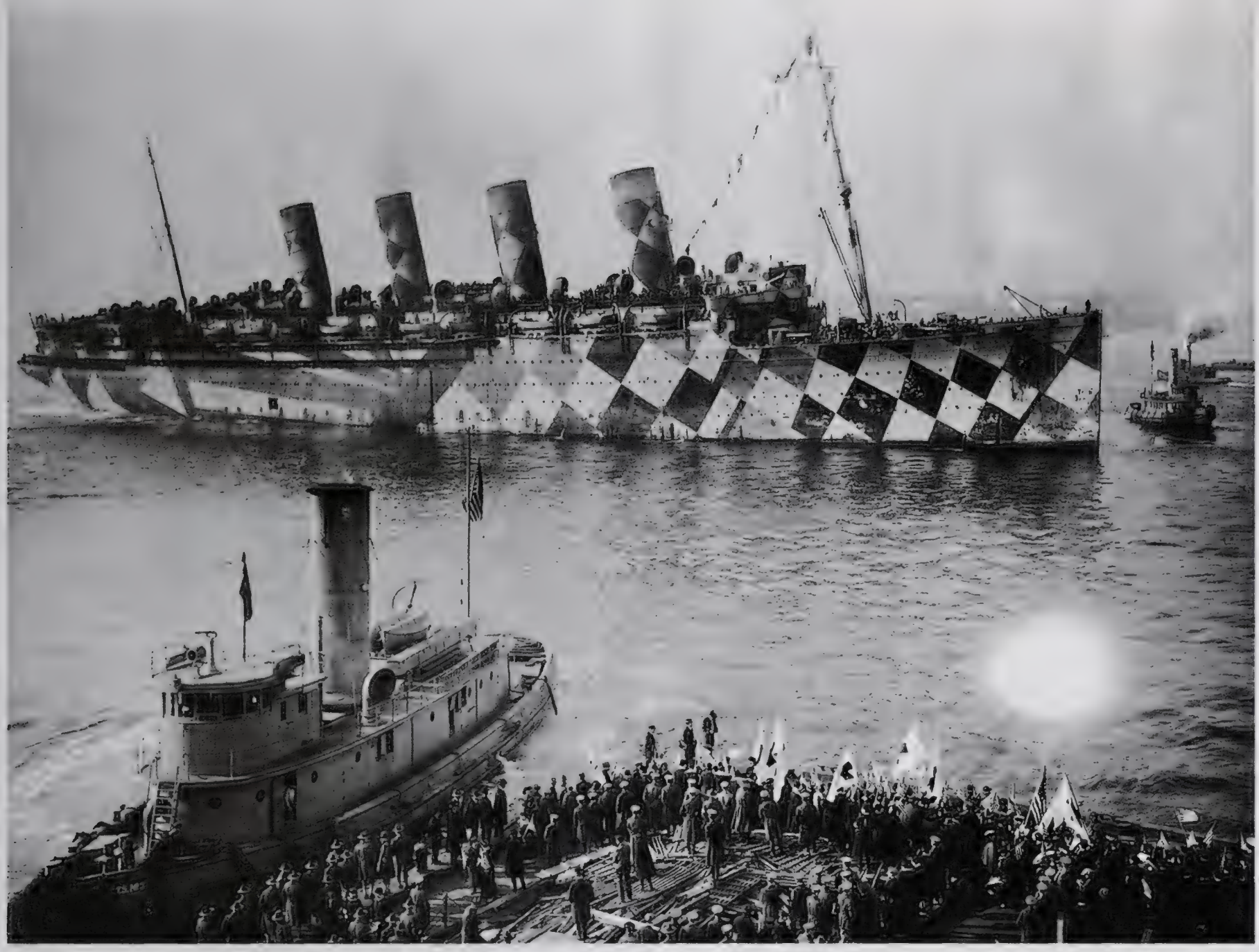

During World War I, the British passenger liner *Mauretania* was painted in a camouflage scheme reminiscent of Picasso's *Harlequin*. Thayer, who advocated painting ships white, likely viewed the project as a misapplication of his theory of disruptive coloration.

For Thayer, formal religion smacked of "hypocrisy and narrowness." His God was pantheistic. Mount Monadnock, his field station for nature studies, was "a natural cloister." He painted more than a dozen versions of it, all with a sense of looming mystery and "wild grandeur."

Believing that his paintings were the "dictation of a higher power," he tended to paint in bursts of "God given" creative energy. His personal standards were impossibly high. Driven by his admitted vice of "doing them better and *better*," he was doomed always to fall short. Finishing a picture became horrendously hard. He was even known to go to the railroad station at night, uncrate a painting destined for a client and work on it by lantern light.

Such fussing sometimes ruined months or even years of work. In the early 1900s he began preserving "any achieved beauty" by retaining young art students—including my father—to make copies of his effects. Two, three and four versions of a work might be under way. Thayer compulsively experimented on all of them, finally assembling the virtues of each onto one canvas.

Though well aware of his quirks and weaknesses, young painters like my father and Fuertes revered Thayer almost as a flawed god. William James, Jr., described standing in Thayer's studio before the winged *Stevenson Memorial*. "I felt myself to be, somehow, 'in the presence.' Here was an activity, an accomplishment, which my own world . . . had never touched. This *could* be done—was being done that very morning by this friendly little man with the distant gaze. This was *his* world where he lived and moved, and it seemed to me perhaps the best world I had ever met."

The inspirational spell cast by Thayer also was experienced by a noted artist named William L. Lathrop. In 1906 Lathrop visited a show at the Academy of Fine Arts in Philadelphia. He wrote: "A big portrait by Sargent. Two portrait heads by Abbott Thayer. The Sargent is a wonderfully brilliant performance. But one finds a greater earnestness in the Thayers. That his heart ached with love for the thing as he painted, and your own heart straight away aches with love for the lover. You know that he strove and felt himself to have failed and you love him the more for the failure."

While "the boys" copied the morning's work, Thayer spent afternoons finding in nature a relief from his fervid preoccupations. He climbed Mount Monadnock, canoed and fly-fished on nearby Dublin Pond. To him each bird and animal was exquisite. He and his son, Gerald, collected bird skins in the Eastern United States, and as far afield as Norway, Trinidad and South America. By 1905 they had

BROWN BROTHERS

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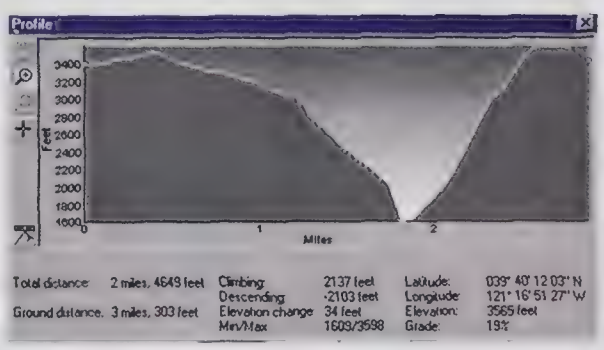

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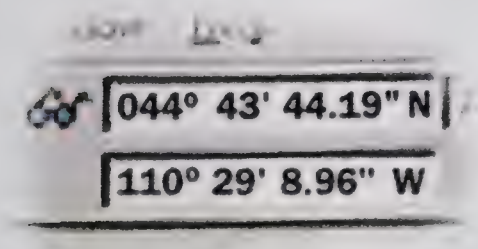

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amassed a trove of 1,500 skins. Using a needle, Thayer would lift each feather into its proper position with infinite delicacy. "I gloat and gloat," he once wrote. "What design!"

World War I devastated the 19th-century spirit of optimism that helped sustain Thayer's idealism. The possibility of a German victory drew Thayer out of seclusion and spurred him to promote the application of his theories of protective coloration to military camouflage. The French made use of his book in their efforts, adapting his theories to the painting of trains, railroad stations, and even horses, with "disruptive" patterns. The word "camouflage" probably comes from the French *camouflet*, the term for a small exploding mine that throws up gas and smoke to conceal troop movement. The Germans, too, studied Thayer's book to help them develop techniques for concealing their warships.

Attired in loose breeches, high boots and paint-splattered Norfolk jacket, Thayer projects the image of the rugged outdoorsman.

When the British were less enthusiastic, Thayer's obsessiveness went into overdrive. He virtually stopped painting and began an extended campaign to persuade Britain to adopt his ideas, both on land and sea. In 1915 he enlisted the help of the great expatriate American painter John Singer Sargent, whose fame enabled him to arrange a meeting at the British War Office for Thayer. Traveling alone to England, Thayer failed to go to the War Office. Instead he toured Britain in a state of nervous overexcitement, giving camouflage demonstrations to friendly naturalists in Liverpool and Edinburgh in the hopes of mobilizing their support. This detour, it turns out, was largely a ploy to postpone what was always for him a paralyzing fear: facing an unsympathetic audience.

Finally Thayer arrived in London for the appointment. He was exhausted, confused and erratic. At one point, he found himself walking a London street with tears streaming down his face. Immediately he boarded the next ship for America, leaving behind at his hotel a package that Sargent took to the War Office.

I always loved hearing my father tell what happened then. In the presence of the busy, skeptical generals, Sargent opened the package. Out fell Thayer's paint-daubed Norfolk jacket. Pinned across it were scraps of fabric and several of Emma's stockings. To Thayer, it told the entire story of disruptive patterning. To the elegant Sargent, it was an obscenity—"a bundle of rags!" he fumed to William James, Jr. "I wouldn't have touched it with my *stick*!"

Later Thayer received word that his trip had born some sort of fruit: "Our British soldiers are protected by coats of motley hue and stripes of paint as you suggested," wrote the wife of the British ambassador to the United States. Thayer continued battling to make the British Navy camouflage its ships. In 1916, overstressed and unstrung, he broke down, and in Emma's words was "sent away from home for a rest."

The United States entered the war in April 1917, and when a number of artists proposed their own ways to camouflage U.S. warships, Thayer refocused his frenzy. He sent a copy of the concealing coloration book to Franklin Delano Roosevelt, then Assistant Secretary of the Navy, and bombarded him with passionate letters decrying the wrongheaded perversion of his ideas by others. "It will be disastrous if, after all, they *dabble* in my discoveries," he wrote. "I *beg* you, be wise enough as to *try* accurately, *mine*, *first*."

White, he contended, was the best concealing color for blending with the horizon sky. Dark superstructures, like smokestacks, could be hidden by white canvas screens or a bright wire net. White would be *the* invisible color at night. One proof, he insisted, was the white iceburg struck by the *Titanic*. Although some credence would later be given to this theory in a 1963 Navy manual on ship camouflage, Thayer's ideas in this regard were primarily inspirational rather than practical.

His theories had a more direct effect on Allied uniforms and matériel. A Camouflage Corps was assembled—an unmilitary lot led by sculptor Augustus Saint-Gaudens' son, Homer. It was for his edification that Thayer had prepared the camouflage demonstration panels that I discovered in Dublin. By 1918 this motley corps contained 285 soldiers—carpenters, iron workers, sign painters. Its 16 officers included sculptors, scenery designers, architects and artists. One was my father, a second lieutenant.

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One of Thayer's final works, *Monadnock Angel* (1920) united two of his favorite themes—idealized, protective winged women and the natural beauty of Mount Monadnock—in one lyrical canvas.

In France a factory applied disruptive, variegated designs to American trucks, sniper suits and observation posts, thereby, as an Army report explained, "destroying identity by breaking up the form of the object." "Dazzle" camouflage used pieces of material knotted to wire netting, casting shadows that broke up the shapes beneath.

During 1918, Thayer's frustration over ship camouflage and terror over the war reached a continual, low-grade hysteria. It was too much even for Emma. That winter she fled to her sister in Peekskill, New York. Thayer took refuge in a hotel in Boston, then took himself to a sanatorium. From there he wrote Emma, "I lacked *you* to jeer me out of suicide and I got into a panic."

In early 1919 they were together again. But by March, Emma needed another rest in Peekskill, and again during the winter of 1920-21. Despite her absences, Thayer settled down, cared for by his daughter Gladys and his devoted assistants. Late that winter he began a picture that combined his two most cherished themes: an "angel" posed open-armed in front of Mount Monadnock (left). In May he had a series of strokes. The last one, on May 29, 1921, killed him. On hearing of Thayer's death, John Singer Sargent said, "Too bad he's gone. He was the best of them."

The Thayer cosmos disintegrated, drifting away into indifference and neglect. There was a memorial exhibition at New York's Metropolitan Museum of Art within a year, but for decades many of his finest works remained unseen, stored in the vaults of the Smithsonian's Freer Gallery of Art, which is prohibited from lending paintings for outside exhibitions. In the post-Armory Show era the changing fashions of the art world regarded Thayer's angels as sentimental relics of a defunct taste.

Emma died in 1924. For a time the little Dublin complex stood empty, decaying year after year. When I was 9, my brother and I climbed up on the roof of Gerald's house, near Thayer's studio, and entered the attic through an open hatch. In one corner, heaped up like a hay mow, was a pile of Gerald's bird skins. I touched it. *Whrrrr!* A raging cloud of moths. The horror was indelible. Thayer's own prized collection of skins was packed in trunks and stored in an old mill house on the adjacent property. Ultimately, the birds deteriorated and were thrown out. In 1936 Thayer's house and studio were torn down. Gerald's house lasted only a year or so longer. The box in our barn was apparently given to my father for safekeeping.

Today, at the end of the 20th century, angels are very much in vogue. Thayer's *Angel* appeared on the cover of the December 27, 1993, issue of *Time* magazine, linked to an article titled "Angels Among Us." These days angels are appearing in films, on TV, in books and on the Web. Today, too, art historians are looking receptively at the end of the 19th century. A major Thayer exhibition opens on April 23 at the Smithsonian's National Museum of American Art. Curated by Richard Murray, the show—which marks the 150th anniversary of the artist's birth—will run through September 6. In addition, the Freer Gallery will mount a small exhibit of Thayer's winged figures starting June 5.

In 1991, during the Gulf War, I watched Gen. Norman Schwarzkopf hold televised press conferences in full camouflage regalia. Yes, Thayer did finally make his point with the military. But he sacrificed his health—and perhaps even his life—promoting what, in some respects, has now become a pop fad that announces rather than hides. Virtually no one knows that all that raiment is the enduring legacy of a worshiper of virginal purity and spiritual nobility. This probably delights Abbott Thayer.

Freelance writer Richard Meryman's most recent book is Andrew Wyeth, A Secret Life, *published by HarperCollins.*

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GREAT BLUES ARE G

These ubiquitous herons are

THE EQUINOX OFFICIALLY ENDING WINTER IS weeks away, but from a great, densely forested bend of the Potomac less than 30 miles downriver from the nation's capital come unmistakable notes of spring's first symphony. It's a sound track for *Jurassic Park*: a rasping, clacking mélange of fricatives and gutturals; the din of a ravening, demented mob; howls, screams, moans, croaks, a growling and whooping; a gargling with oyster shells—utterances, perhaps, like those of pterodactyls.

Anyone not clued in as to the source would be tempted to flee the woods. But do press on, deeper among the tall oaks and girthy beeches. Savor the unearthly sounds: like the new wine of the season, they are a lusty tonic with hints of baying wolf and overtones of primordial swamp. For deep in the woods lies a heronry, one of the Atlantic Coast's largest rookeries of great blue herons. Some 2,000 have assembled on protected land near the little southern

BY TOM HORTON ■ PHOTOGRAPHS BY DAVID HARP

OING GREAT GUNS

learning to live with people

Maryland town of Nanjemoy to mate and nest and rear their young, gorging on the spring and summer protein bounty from the fecund shallows and marshes of the Chesapeake Bay region.

It is February, in the glow of predawn, when the herons return to begin anew the cycle of their year, says Calvert Posey, Sr., who worked 12 years as a Nature Conservancy steward to preserve the place. (In actual practice, visitors are not allowed.) A naturalist and lifelong Nanjemoy resident, Posey discovered the burgeoning heron colony in 1944, when he noticed great blues flying about in numbers he had never before seen.

Four times in the past half century, Posey was actually standing beneath the nest trees at the very moment the birds arrived from their wintering grounds. Each time, a lone bird would glide in, on wings that span six feet, and circle the nesting grove,

The big birds happily nest on towers on Bloodsworth Island in Chesapeake Bay, part of which the Navy uses for gunnery practice.

Everyone who lives near a merge of land and water has seen a great blue standing sentinel there.

shattering the stillness with a series of terrible croaks.

The scout would flap off. Then, within 30 minutes, wave after wave of herons, in flocks of 25 to 50, would appear, flailing down onto the hundreds of crude, stick-built nests that crown the uppermost branches of the highest oaks and pines.

In the days and weeks that followed, Posey would watch for hours as the birds, after pairing off, began a combination of mating ritual and nest building: "They would break sticks off trees—never pick them up from the ground—present them to their partners with a little bow, and get a little bow in return as the sticks were passed. This might go on a couple of days."

Because their arrival was invariably around February 14, Valentine's Day, Posey has always referred to the herons as "love birds."

Not one of our 50 states claims the great blue heron as its official bird—but most could, without apology. Regally plumed, strikingly colored and standing four feet high, it is among the most noticeable and ubiquitous of North American wading birds. Everyone who lives near a merge of land and water, from ocean beaches to Grand Canyon gorges, from tidal marsh to farm pond, from roadside drainage ditch to trout stream, has seen a great blue standing sentinel there, sinuous neck and marlinespike beak cocked for a lightning lunge at any feckless prey that passes.

When startled from its foraging it flaps away, rasping—and frequently defecating—with all the indignation of a rightful owner. Indeed, from western Alaska, down along British Columbia, around the entire U.S. coast to Nova Scotia, and up every major continental river system to the capillary ends of its drainage, no bird has achieved a more intimate and

While researchers banded the legs of nearby hatchlings, a pair of adult herons temporarily abandoned their nest, providing a rare opportunity to photograph the eggs.

Chicks scan the horizon for that most welcome of sights: a parent coming to feed them. Less than two ounces when hatched, they will weigh 4.4 pounds within two months.

The adult heron at left (note the breeding plumes on its neck) is regurgitating half-digested food into the mouth of one good-sized chick while the other begs for a turn at the trough.

more arresting fit within the North American landscape.

The great blue heron and its extended family, the Ardeidae (herons, egrets and bitterns), also represent an extraordinary degree of evolutionary fitness. The fossil record indicates the genus *Ardea* has been around for at least 14 million years, and a species virtually unchanged from the great blues we see today was stalking prehistoric swamps 1.8 million years ago. Of some 80 heron species known to have developed through geologic time, 60 are still in business. Even within a family noted for adaptability, the great blue is remarkable. Consider its diet. Bird books generally list what a species eats, but with a great blue it might be easier to list what it won't eat.

Like most of the ibis, egrets and other, smaller herons, it feeds heavily on fish and crustaceans. But when the need arises, the great blue shows formidable skills as an upland and even urban hunter; and the size of its prey, usually swallowed whole, would impress anything short of an anaconda. So it is that hungry great blues have been observed beaning and swallowing sora rails and adult muskrats around Chesapeake Bay, not to mention stalking and eating gophers on public soccer fields near San Francisco Bay.

A great blue was photographed on a parking lot in New York City, a large, limp Norway rat seized in its bill. Voles and toads are more typical of its dryland foraging, but there was a heron on Smith Island, a crabbing community in the middle of Chesapeake Bay, that made it through a freeze-up by dueling with a mother cat for her late-season litter.

Such a supreme opportunist, a survivor proven through dozens of millennia, the great blue heron would seem to have few problems coping with the 21st century. Indeed, its numbers appear to be stable or increasing across most U.S. states and Canadian provinces, based on 30 years of random volunteer surveys conducted each year by bird-watchers. Partly, the uptrend may reflect the subsidence of DDT in the environment, says Bruce Peterjohn, a federal biologist at the Patuxent National Wildlife Research Center in Maryland, who is developing a new, more comprehensive database of colonial waterbird populations for North America. The pesticide, banned not too long after calculations of heron trends began in the 1960s, bioaccumulated in aquatic life and in the birds that ate it, including bald eagles and ospreys.

A result was thinner eggshells and lower hatching success. Even today, breakdown products of DDT remain, and studies of great blue heron eggs show shell thickness has not quite returned to that of pre-DDT samples preserved in collections.

Another likely key to the great blue heron's success has, ironically, also sentenced thousands of herons to death "at the end of a shotgun," says Mike Erwin, a Patuxent researcher based at the University of Virginia. It has to do with the way we humans create landscapes that inadvertently turn out to favor highly adaptive species of wildlife.

Great blue herons have been quick to capitalize on the upsurge in backyard fishponds, "pay to fish" recreational lakes and especially fish hatcheries and aquaculture ventures that have created hundreds of thousands of acres of lakes, abrim with catfish, striped bass and other species.

The great blues rise stark and elemental against a backdrop of oil tankers, power lines and refineries.

To great blue herons, it has been an invitation to a banquet, a significant new supply of nutrition. Aquaculture companies have responded by obtaining federal "depredation" permits to shoot as many as 4,000 great blues a year (otherwise, the herons are protected by an international migratory bird treaty and other laws dating from the early 1900s).

Bald eagles, whose comeback is another bird success story, also may increasingly collide with great blues, which fear few other creatures but have been known to summarily abandon a whole colony when a pair of eagles decides to nest there.

The eagles prey on heron chicks, and sometimes even take adults. They also frighten herons off their nests, with deadly results. Within moments, the crows that cohabit many heron colonies swoop in, winging away with the herons' unguarded eggs speared on their beaks.

"They [bald eagles] are really hitting the herons out here now . . . it is a story still unfolding," says Canadian Wildlife Service scientist Robert W. Butler. He says there are four eagle nests not far from his office just outside Vancouver, British Columbia.

Thousands of miles of salmon-rich, rain-forested coastline make British Columbia a haven for up to 9,000 eagles, a population that continues to grow. Meanwhile, great blues in British Columbia have been showing a steady decrease of around 6 percent a year. It is the only region in North America where the species, though still numbering more than 4,000, does not appear to be holding its own and is considered vulnerable.

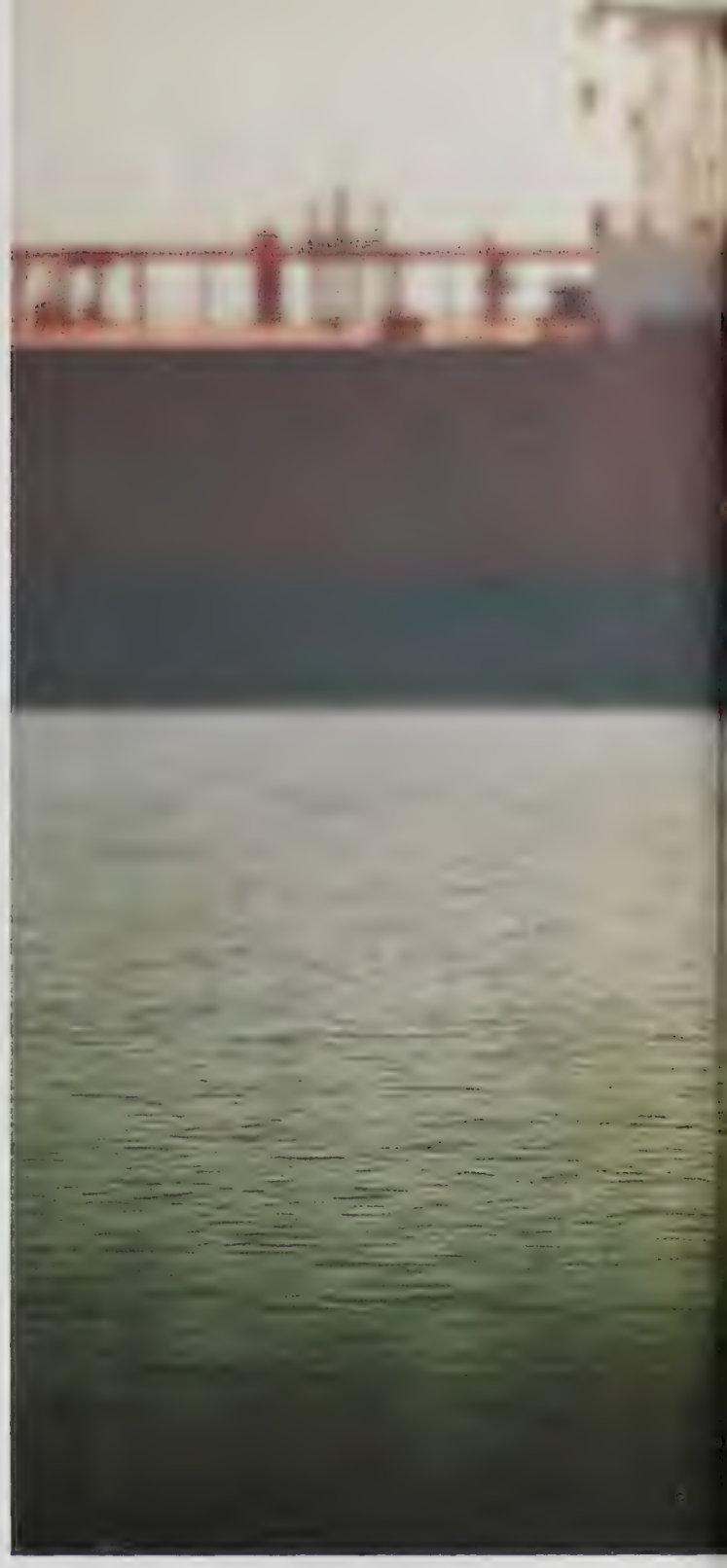
Butler, in his 1997 book, *The Great Blue Heron*, says: "The future for the heron does not look very rosy." It is not just eagles; about 1 of every 15 Canadians now lives around the southern British Columbia coastline, which also includes the choicest heron habitat. Given the steadily rising population in the region, Butler writes: "Soon there will be very few quiet woodlots on the south coast where herons can nest in peace."

British Columbia's interplay of eagles, humans and herons is a likely harbinger for many areas. Eagles are coming back strongly enough to have been downgraded from endangered to threatened in the lower 48, and a majority of Americans now live in the coastal regions most favored by nesting great blues.

Indeed, many wildlife experts think that if the highly adaptable great blue has an Achilles' heel, it is probably the shrinking number of places suitable for its nesting colonies.

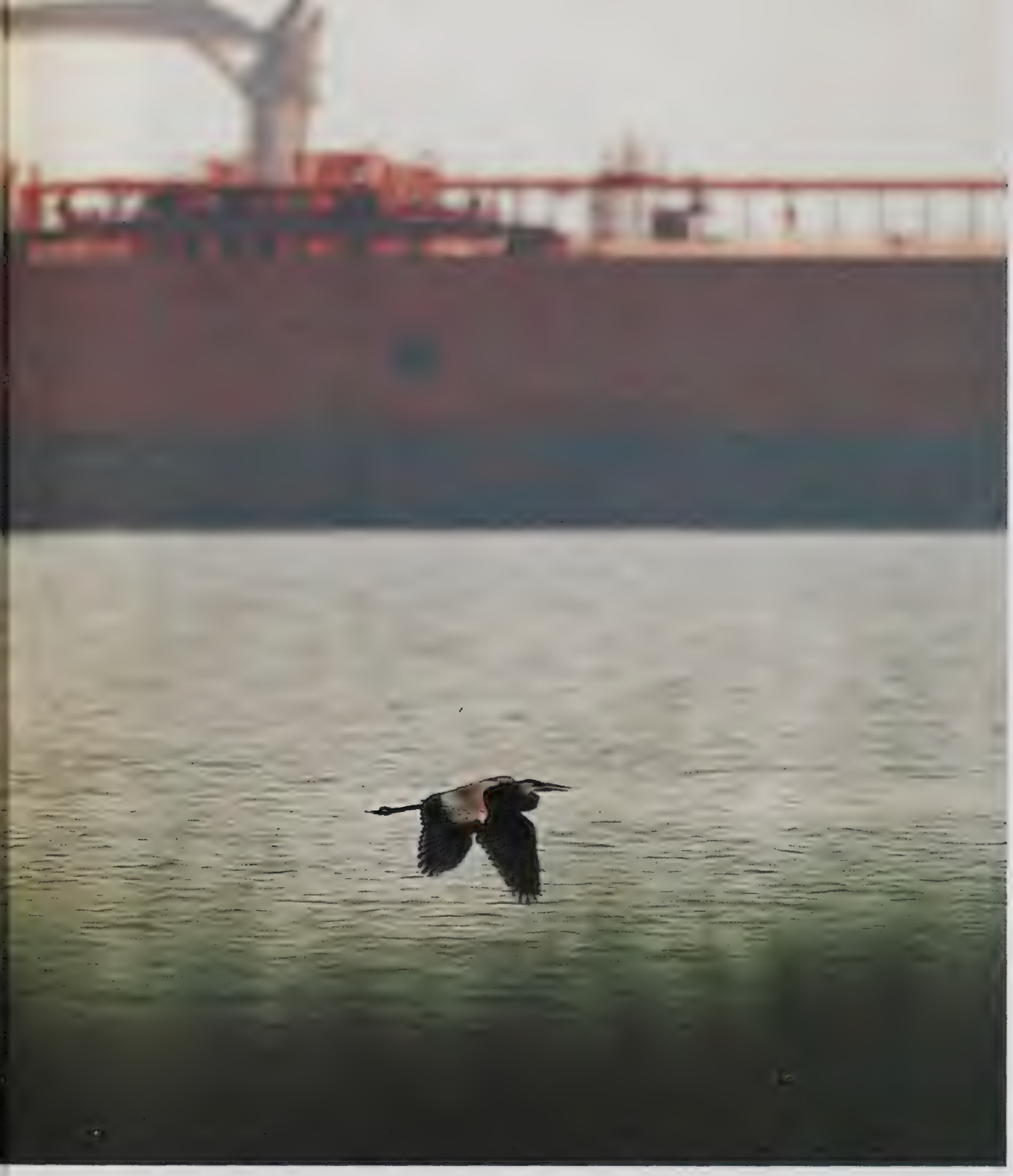
Paradoxically, while most people have seen great blue herons foraging singly for food, very few have been privy to the spectacular, cacophonous group settings of their breeding colonies or have witnessed the courtship and bonding rituals on display there. That is partly because great blues prefer to nest in the highest trees available, frequently 100 feet above the ground and obscured by foliage; it is also because they seek, wherever possible, solitudinous sites, isolated from intrusion by humans and mammalian predators. The herons' need for such places amid an increasingly settled landscape can produce some odd and unexpected juxtapositions. Few are more striking than Pea Patch Island in the lower Delaware River near Wilmington, Delaware, where one of the nation's greatest heronries has been established amid an industrial complex and a major shipping channel.

In recent years, a detective story has been unfolding there, as scientists



from the Manomet Center for Conservation Sciences, in Massachusetts, have probed for the cause of troubling declines among some of the heron species nesting on the island. The scene at Pea Patch appears ancient and timeless, the trees and shrubs festooned in the heat of a late spring day with thousands of nesting egrets, ibis and herons. The great blues, which make up about 5 percent of this mixed colony, have predictably commandeered the heights, and rise stark and elemental from the treetops against a backdrop of oil tankers, high-tension power lines and refineries along the Delaware shore.

All this is fairly recent. The island itself first emerged from the river as a



A great blue makes its appointed rounds, unperturbed by an 830-foot tanker from Singapore sliding by in the lower Delaware River. The birds appear to feel safe on islands there.

mudbank in the late 1700s. By 1859, historic Fort Delaware, which now draws 30,000 tourists a year, had been built there to guard Wilmington and Philadelphia. The island continued to accrete sediment, and doubled in size early in this century after it became a depository for spoil from channel dredging. As the spoil mounds on the island's isolated northern tip grew up in forest, herons began moving in during the 1950s. By the early 1990s, it had become the largest "city" in Delaware outside of Wilmington, hosting an annual pageant of some 36,000 herons (adults and young) of more than half a dozen species. Snowy egrets, cattle egrets, little blue herons, glossy ibis and black-crowned night herons make up about 80 percent of the colony.

Katharine Parsons, Manomet's lead scientist in the Pea Patch investigation, says the buildup of herons there is part of a more widespread move from increasingly fragmented mainland areas "to true islands, wherever these occur." She has spent years studying herons that have successfully colonized islands within New York and Boston harbors. But in the past few years, the Pea Patch Island colony has been in mysterious decline, falling from a peak of 12,000 to 13,000 nesting pairs to fewer than 7,000.

It is not unknown for herons to pull out of a colony for no apparent reason. At other times, herons kill their own nesting trees through years of copiously defecating on them: "guanotrophy," biologists call it.

Something more troubling seemed to be going on at Pea Patch, Parsons said. Despite adequate food supplies, some species were raising young in lower than expected numbers. In fact, cattle egrets at Pea Patch were only reproducing half as well as those in highly industrial sites such as New York Harbor.

For researchers like Parsons, a large heron colony is more than a spectacle of nature. It is a superb ecological lens. Feeding on the top levels of the food web and ranging out to forage across miles of surrounding marshes, stream valleys and fields, the nesting birds quantify—in their eggshells and tissues and in their hatchlings—environmental quality in ways that no amount of conventional monitoring or sampling can match.

Pea Patch's herons were signaling that something was amiss. And given their prior experience with urban, industrial heronries, the researchers believed that the answer was not the one that might have seemed obvious at first glance, the surrounding industrial complexes. Rather, the researchers suspected the answer might lie in whatever was causing an unusually high number of lesions on the abdomens of young birds in many of the nests at Pea Patch. The immediate cause of the lesions appeared to be a beetle that lives in the heron nests, scavenging on scraps of regurgitated food that the adults feed to their young.

The beetles are in heron nests everywhere, not just at Pea Patch; but on the Delaware River island they seemed to be causing lesions, most severely among those species, such as cattle egrets, that foraged heavily in farm fields and other upland areas. Birds nesting around New York City didn't show such problems; but those

Taking their first steps toward independence, these heron chicks on Bloodsworth Island have climbed out of their nests. Once they can fly, their parents will no longer feed them.

that fed near commercial cranberry bogs in Massachusetts did.

The Manomet research team's hypothesis, which is gathering substantial support now after the scientists conducted years of painstaking analysis, is that the lesions are related to lowered levels of cholinesterase, an enzyme basic to transmission of nerve impulses in all animals. The affected birds may be too lethargic to avoid beetle bites.

The lower cholinesterase, in turn, appears linked to adult birds' feeding where organophosphate pesticides (the more benign successors to organochlorine compounds such as DDT) are used. A number of important "So what?" questions remain to be resolved, Parsons says: "Does low cholinesterase relate to low nesting survival? How do lesions and low cholinesterase affect populations?"

The answers will have important implications for something known as the SAMP—a Special Area Management Plan developed by New Jersey, Delaware, the federal government, and private environmental, business and agricultural interests. The SAMP aims to build consensus for environmentally sound land uses, and for wetlands protection and restoration across thousands of acres, using the Pea Patch herons as a focal point.

Herons offer not the slightest defense of eggs and young, flapping off when intruders approach.

The island's complement of great blue herons has not been studied yet for lesions (great blues usually nest so high, often in rotting trees, that nest studies are difficult for even dedicated researchers). Also, the island's great blues are reproducing well, and their population during the Manomet study has been among the most stable of any species in the huge colony.

Parsons says this is probably testament to the great blue heron's ability to make a virtual smorgasbord of many different food sources in all available habitats. Unlike most herons, it feeds with equal ease in fresh and salt water, in tidal and nontidal marshes, in uplands and wetlands.

Florida's great white heron, a subspecies of the great blue, has made a specialty of staking out fish docks and marinas along the coasts there, bullying pelicans and other species to get more than its share of handouts from humans. I have watched great blues foraging everywhere from the edges of a wild turkey flock in woodland understories to the leachate pit at my local landfill.

Nesting, however, is a different story. Great blues' predilection for isolation appears then to be their primary defense against intruders. For all their hunting prowess, size and formidable bill (which has caused serious injuries to unwary bird banders), the herons offer not the slightest defense of eggs and young, flapping off out of sight with scarcely a protest when intruders approach.

In photographing this story, David Harp and I developed a routine in which both of us would go into a blind and I would then leave. The herons, which apparently cannot count, would soon settle back into their nests. On decamping, I would again enter the blind, and both of us would exit together

If Pea Patch Island's juxtaposition of herons amid heavy industry seems odd, then Bloodsworth Island, an uninhabited 5,360-acre marsh in the middle of Chesapeake Bay, is perhaps the unlikeliest place of all. Home each spring and summer to hundreds of great blues, Bloodsworth is also an active U.S. Navy bombing range. Over the decades it has been strafed and bombarded by jets and shelled by destroyers. The Navy SEALS recently put a plan "on hold" to use it as a practice ground for "extracting" mock victims while receiving—and returning—live fire from planes and boats.

So far the herons haven't seemed to mind. The colony may even be attracting possible evacuees from a large heronry on Smith Island, some ten miles to the south, where a pair of nesting eagles set up shop a few years ago. Many great blues remaining on Smith are now nesting in trees lower than they prefer, but well removed from the eagles.

A lone heron forages in shallow water among rushes and spartina grasses. It can change the focus of its eyes from forward to straight down without moving its head.

While naval warfare exercises on Bloodsworth are restricted to outside the herons' main colony, one nest with four chicks was established only feet from a large, rusting bomb embedded in the marsh. "Pull pin to arm," says stenciling on the side. The pin is still in.

Around the main colony, charred stumps of trees suggest that mistakes could have happened, probably in the 1960s. So it is that the island's great blues now nest mostly on a small forest of artificial platforms, layered atop one another, jutting from six-by-six, salt-treated timbers erected by the Navy. The platforms provide a unique opportunity to observe great blue herons en masse, unusually close to the ground and unobscured by so much as a limb or a leaf.

Here in the mid-Atlantic, the time from late February into April is when the great blues are at their most splendid and raucous as they seek mates and bond. They are a sight to behold, freshly molted plumes frothing from the neck and chest and back, beaks and lores (eye patches) flushed with color. Their necks display hues of violet and cream, brilliant black and chestnut for maximum advantage in rituals of stretching and bowing, fluffing and craning. They also duel gently with their bills. At such times they may utter the closest a heron can come to a tender sound, a strangled sort of "goo, goo."

Copulation is almost an anticlimax. The female bends slightly forward and partly spreads her wings, swaying on the nest as the male hooks his toes on her shoulder, flailing the air and grasping her neck in his bill for balance as he lowers himself against her. A few seconds later, it is over.

An immature bird wrestles with a goldfish it has snagged out of a backyard pond in north Baltimore. Learning to catch fish big enough to sustain it is key to the bird's survival.

At times I have observed heron couples, in the throes of a springtime amour, touching gently, almost sensuously—thigh to thigh, breast to breast, bill tip to bill tip; and in this posture it happens that their glossy necks, curving fluidly between chest and beak, form something akin to the shape of a valentine. Watching them gazing steadfastly into each other's lidless, unblinking eyes, it is not hard to recall Calvert Posey's moniker, "love birds," and to believe that something more than instinct is at work.

Facilitating the selection of a mate may be the best explanation of why great blue herons gather in colonies to nest, believes author and researcher Rob Butler. Other explanations have been offered: colonies provide defense or enable the birds to exchange information about where to find food. But the evidence is not clear and the jury of researchers is still out. Only in dense groups can herons—which don't mate for life—go through the considerable annual "comparison shopping" exhibited by both males and females before forming pairs in a reasonably short time. This in turn allows them to get on quickly with the all-important business of reproducing, Butler says.

Once mated, great blue females lay from a couple to half a dozen eggs, greenish-blue and roughly the size of a chicken's. By April or May, after about a month's incubation, virtually every nest has its complement of fuzzy chicks, all bills and legs. As many as four hatchlings may make it to fledging, though often one or two of these get evicted from the nest by their larger brothers and sisters. Once on the ground a chick is doomed.

Adults seem oblivious to the plight of young thus disenfranchised. As June and full summer roll torporously over the marshes, the chicks are almost as large as adults, though still weeks away from being able to fly. They often set up a fierce clamor before the human eye can detect an approaching adult. Alighting on the edge of the nest, the adult submits to having its bill grabbed by the young, which triggers a regurgitation of half-digested food into waiting gullets. For all of a heron colony's color and form and noise, the strongest impression on those who enter a nest site may be the fetid odor of mingled vomit and guano, an unforgettable summer stew.

Feeding now becomes the adults' full-bore occupation. A heron family at this point requires a daily caloric intake equivalent to the needs of a grown human. The parents may range a dozen miles or more from the colony to forage. Their bright courtship colors fade, and their amorous displays all but cease as raising a family becomes serious business. It is hard not to think of parallels to the human condition.

By August, the spectacle that began in February, amid sleet storms and frigid nor'easters, that continued through spring thunderstorms which blasted the herons and their chicks with 50-mile-per-hour gusts, is winding down. The young, most flying now, are scattering to begin fishing and foraging on their own.

They are fully as large and developed as their parents, but perilously far from being as capable of feeding themselves. In fact, according to Rob Butler, one of the few researchers to have tracked great blues through their entire yearly cycle, only one in five juvenile great blues survives to become a breeding adult in its third spring. Butler says the biggest reason for such high mortality appears to be the difficulty great blues experience in learning to catch large fish.

They are among the least kinetic of the herons in feeding—wading very

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slowly or, more often, waiting motionless for hours before striking with such enthusiasm that the whole head, neck and chest enters the water.

"Studying great blues feeding is a good way to get bored out of your gourd, because mostly they just sit there," says Patuxent director James Kushlan, who is also coauthor of *The Herons Handbook* and other works on wading birds. Obtaining a lot of calories when they do eat becomes much more important for a great blue than for a bird such as an egret, which sips minnows peripatetically.

Watching an adult great blue grasp a fish of a pound or more in its bill (or spear prey on its long beak, as it sometimes does), one can appreciate the difficulty. The bird often stabs at its catch for several minutes to subdue it; then, the heron must position the fish to slide headfirst down its throat (the wrong way with a stiff-spined fish can mean a slow, painful death for the heron). The relative few juveniles that do master the difficult techniques can look forward to a long life, 20 years or more, as even bald eagles prey infrequently on full-grown blue herons.

Considering the glorious and haunting bugles, trumpeting and honking of other long-necked birds—cranes, swans, geese—great blues may at first seem to have been shortchanged. But you cannot observe them for long before realizing that these birds are eloquent beyond words. Herons, all angles and curves, have a body language without peer. Their collapsible, extensible frames can shift from shrunken to regal in a trice. They write their own ancient language, posing with gangly delicacy, stark as runes, against a rising moon or setting sun.

The great blue heron's near-term future is scarcely in doubt. One estimate of the North American population is 133,000 nesting pairs. Ironically, that estimate was compiled by the U.S. Department of Agriculture to bolster the case for issuing an increasing number of depredation permits to aquaculture facilities.

Landing gear down, a great blue returns to the nest. The head sticking up is probably its mate's.

The number of great blues legally shot (13,364 between 1987 and 1995) should not endanger so populous a species, the USDA says. Nonetheless, the trend is sharply upward, with 2,798 killed in 1995, compared with a couple hundred a year in the 1980s; and some biologists, such as Patuxent's Mike Erwin, worry that the links between heron predation and aquaculture losses are not so clear as to justify more shooting.

Increasing clashes with eagles seem likely, though this may be self-limiting. Canada's Rob Butler says that, because eagles don't like to nest near one another, "having one pair around may keep larger numbers [of eagles] away from the herons."

There is virtually no broad, formal protection for heron nesting sites, other than for groups to buy them, as did the Nature Conservancy at Nanjemoy in Maryland. Pennsylvania wildlife officials, for example, are negotiating with a private landowner who wants to cut down the sycamore trees on the site of one of the state's primary great blue colonies for firewood, a use that gives the trees an estimated total value of $750. The state does not want to set a precedent by paying to preserve the site. "I hope some environmental group can maybe just give him some firewood," says the state game commission's Dan Brauning.

Logging and development seem certain to close more and more options for nesting herons as the coastal regions continue to be desirable for both humans and birds. Some evidence suggests, however, that the ever-adaptable great blues can adjust to the human presence, even during nesting. One of British Columbia's longest thriving heronries is on the grounds of the heavily visited Stanley Park in downtown Vancouver.

In coastal areas channel dredging generates mountains of spoil, and there is a growing trend toward creating islands or restoring eroding ones. As vegetation takes over the new areas, herons as well as other birds will be among the beneficiaries. It seems a good bet that if we humans do our part to preserve wetlands for feeding and wooded spaces for nesting, the marvelously adaptable great blue heron will meet us at least halfway.

Tom Horton is the author of the award-winning Bay Country *and other books about Chesapeake Bay. David Harp is a photographer whose latest book is* Water's Way.

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Satellite imagery captures Bonnie's deadly vortex over the Carolinas from above, while meteorologist Bill Keneely (right, with notepad) fights the hurricane's tempestuous winds on the ground in preparation for a live update on the Weather Channel.

Stormy weather—*Live!*

EVERYONE TALKS ABOUT THE WEATHER—
THE PEOPLE AT THE WEATHER CHANNEL
LIVE IT 24 HOURS A DAY

BY DAVID LASKIN

FOR BILL KENEELY AT THE WEATHER CHANNEL, it's the worst news he's heard all day. The clean-cut, clear-eyed on-camera meteorologist has just learned that Hurricane Bonnie, after wallowing off the Carolina coast for the past two days, has now set its sights on southern North Carolina. To be precise, Bonnie is heading for the finger of North Carolina sand between the Cape Fear River and the Atlantic Ocean where Keneely is standing and beaming his infectious, boyish smile into a camera lens as he makes his half-hourly update of conditions on the coast. When Bonnie makes landfall—predicted to occur in the next 24 hours—this strip of barrier island beach near Wilmington is going to feel the first and possibly the hardest blow. Winds of up to 115 miles per hour; a storm surge that could rise to 12 feet if it coincides with tomorrow's 11 A.M. high tide; 10 to 30 inches of rain. In short, meteorological Armageddon.

But Bill Keneely won't be here to experience (and film) it. For the self-professed "weather weenie," that's the bad news. It's 2:30 P.M. on Tuesday, August 25, 1998, and Laureen Chambliss, the brisk, young field producer, has just gotten word from the Weather Channel's Atlanta, Georgia, headquarters that she and her team—Keneely, camera-

PHOTOGRAPHS BY ALEX QUESADA

Bonnie's torrential rains and heavy winds lash a section of U.S. 70 in Morehead City, along North Carolina's coast. At the height of the storm, nearly a million homes and businesses in North Carolina and Virginia lost power.

man Randy Frostig, and the two freelance engineers hired to operate the rented satellite "uplink truck" that beams Keneely's live reports back to Atlanta and out to the world—must pull back and find a more sheltered location inland. Shelter? Who cares about shelter when a Category 3 hurricane (out of a possible 5 on the Saffir-Simpson scale) is practically in hand?

"I've never done an eye," Keneely says wistfully, glancing out at the sullen horizon as the engineers roll in their cables. "Now we're heading inland with our tails between our legs." (Much of the local population has already retreated under an evacuation order that becomes mandatory at 5 P.M.) But the executive producers of the Weather Channel in Atlanta must keep the big picture in mind. Covering hurricanes is an infinitely complex job of great finesse, like playing a chess game against a canny opponent who keeps changing the rules. Hurricanes can switch directions in moments, linger for days before sprinting off all of a sudden, or make landfall hundreds of miles from where they're anticipated.

WHETHER IT'S TRACKING A HURricane or pinpointing severe weather or just predicting the daily parade of high- and low-pressure systems, the Weather Channel has become a grand master of the weather game. Its success has built a loyal following: an average of 12 million people in the United States watch every day, many of them tuning in because their jobs, their health, their comfort and safety depend on knowing the forecast. According to the Weather Channel's current chief executive officer, Michael J. Eckert, market research reveals that dedicated users include business travelers, weekend athletes, gamblers (weather conditions at tracks and ball fields can be crucial), golfers, outdoor workers who don't work when it's raining, parents sending kids off to school, seasonal sports enthusiasts, farmers, commodity traders, and everyone involved in aviation or marine activities. These loyal viewers have vaulted the Weather Channel into the 14th most popular cable channel out of a field of 200.

It wasn't always so. Back before 1982, the country didn't yet know it needed a cable network devoted entirely to weather. But John Coleman did. In his five years in the weather slot on *Good Morning America*, Coleman, a trained meteorologist, had become frustrated at trying to squeeze a continent's worth of weather into 2½ cute, lighthearted minutes. And so he came up with the wild idea of starting a network that did nothing *but* weather. Serious, round-the-clock weather coverage without the pranks and gags of the Willard Scott school of forecasting: that was Coleman's dream.

"Coleman was a futurist," says Eck-

PHOTO: © 1995 NOAA NATIONAL CLIMATIC DATA CENTER

ert, who has been with the network since its start-up. "He understood the potential that existed in the convergence of communications satellites, cable television and information technology." Coleman took his idea to the Virginia-based media company Landmark Communications, which decided to finance the operation. Both Coleman and Landmark did extensive market research on "weather consumers"—who they were, how often they would watch, what kind of information they wanted.

THE NATIONAL WEATHER SERVICE was so enthusiastic about the Weather Channel concept that it agreed to reformat its zone forecasts so they could be carried by the Weather Channel's computer. But the news media were initially dubious, to say the least. "Newspapers, the trade press, the national news magazines, television and radio stations—everyone laughed at us and even predicted the date on which we would close," says Eckert. Cable operators were tepid, advertisers were slow to sign on, and the operation went into fiscal free-fall, losing $10.6 million in the first year. An early casualty was founder John Coleman, who left the network after a year because of differences with Landmark management. But things began to turn around when Michelin became a sponsor. As the network gained credibility, more and more cable operators started to carry it, and viewers came to recognize the Weather Channel as a kind of brand.

By 1985 the company, now profitable for the first time, was reaching 18.4 million cable households, up from 3.2 million in its launch year. That figure has now topped 70 million. As the network grew from several dozen employees at start-up to around 600 today, the operation had to move twice. The most recent move was in March 1997, to a gleaming white eight-story office building right

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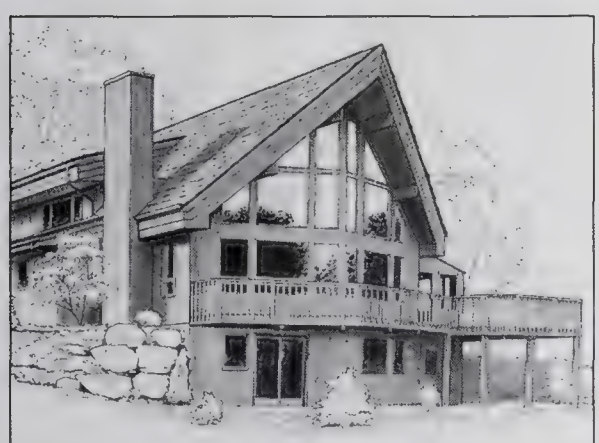

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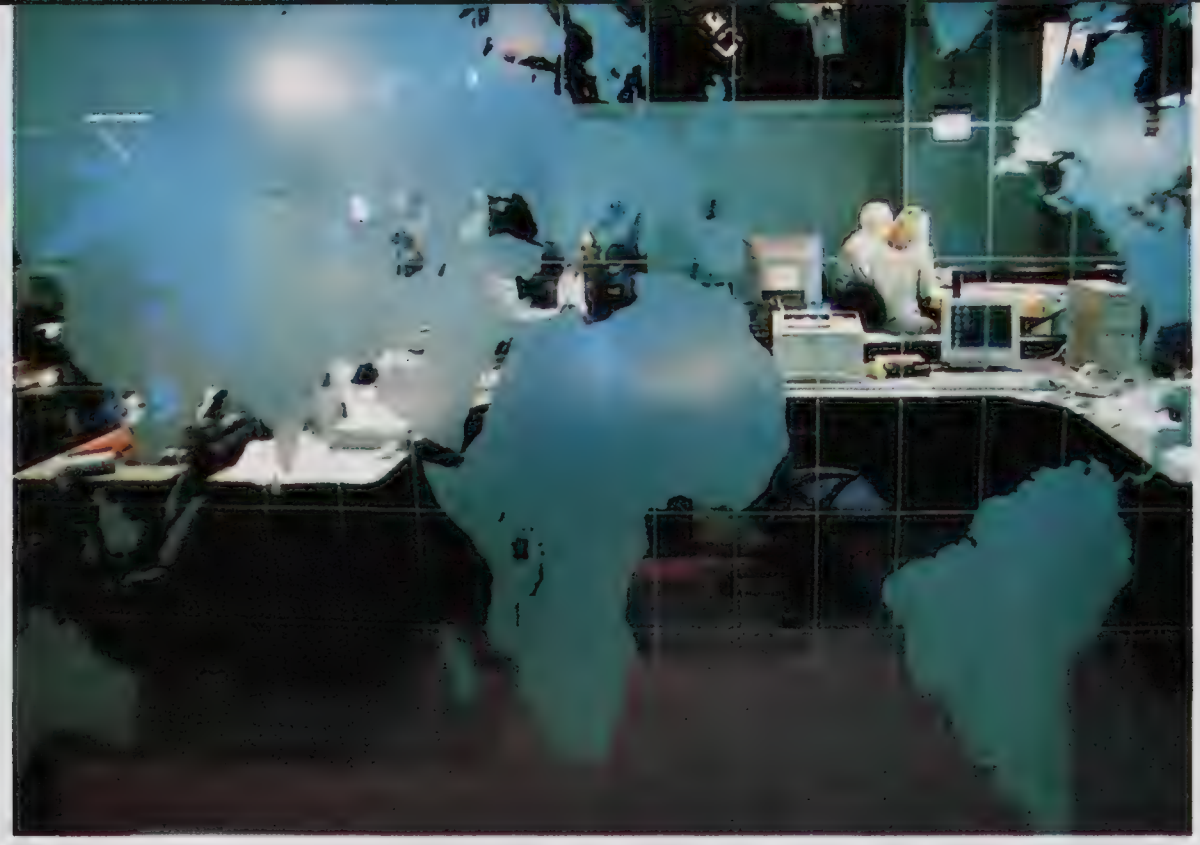

Tropical specialist John Hope and on-camera meteorologist Jeanetta Jones report Bonnie's latest developments from the Severe Weather Update Desk in Atlanta, Georgia.

off an Interstate north of Atlanta.

Things are never dull around the Weather Channel, for in our land of clashing air masses there's always something going on meteorologically: a squall line pushing through the Upper Plains, "lake effect" snow around the Great Lakes, monsoonal moisture blowing in off the Gulf of Mexico. But it's during major weather—potentially deadly storms like hurricanes and blizzards that cover a wide geographic area—that the network really comes to life. And on this day in 1998, that's what Hurricane Bonnie is shaping up to be.

THE STUDIO IS ALREADY IN WHAT Eckert calls "clear-the-decks mode"—barbecue and sandwiches ordered in to feed staff meteorologists working overtime, "war rooms" buzzing with conferences; the normal programming format modified for special hurricane reports, phones ringing off the hook with interview requests from the media—while out on the North Carolina coast, three Weather Channel field crews are strategically positioned to capture the advancing storm.

Keneely's crew is the farthest south and thus likely to get hit first by this slow and somewhat disorganized hurricane with a girth of 350 miles. Bill Keneely is ready. Although he barely slept last night and suspects (correctly) that he'll be sleeping even less tonight, he radiates the barely contained excitement of a kid on Christmas Eve. This is a man who has been obsessed with weather from the age of 9 when a blizzard dropped a foot of snow on his New Jersey backyard right in time for Christmas 1967. An atmospheric sciences major who joined the Weather Channel in 1982 when the cable phenomenon was just getting started and he was scrambling for his first break in national television, Keneely loves what he does even on a dull day when there's "no weather" (what most normal people call gorgeous). Only tomorrow is not going to be dull for anyone on the North Carolina coast, least of all Bill Keneely.

Before the crew pulls out to scout for a new location, Keneely makes a quick call back to Atlanta headquarters. He needs to confer with John Hope, the Weather Channel's hurricane guru. Though he's semiretired, Hope comes in to consult whenever a hurricane looms, and he wouldn't miss this storm—the first Category 3 of the season—for the world. At 79, Hope is the grand master of tropical weather, a veteran of 20 years at the National Hurricane Center (NHC) in Miami who, like Keneely, came on board at the Weather Channel right from the start. Joining Hope is Steve Lyons, a fellow veteran of the NHC.

The Weather Channel's resident hurricane experts, Steve Lyons, left, and John Hope, track Bonnie's movements by monitoring surface observations and coastal buoy reports.

Trim, intense, modest, and blessed with a calm demeanor and a runner's stamina, the 44-year-old Lyons will share with Hope the grueling job of tracking Bonnie's progress over the next 48 hours and reporting the latest to Weather Channel viewers every half hour, just about round the clock.

"Hey, John, draw a line from the eye to the coast," Keneely says from his perch in the cramped, steamy satellite truck control room as he reaches for a road atlas. Even with all his experience, Keneely would be lost without the electronic umbilical cord to Atlanta, where John Hope is just getting up to speed by rifling through the latest computer forecast models, satellite and radar imagery, and the tracking discussion from the NHC.

THE WEATHER CHANNEL FORMULA for success is a blend of Hope's expertise in Atlanta, the drama of Keneely's field reporting—and behind-the-scenes technical wizardry. Technologically, one of the most formidable hurdles to running a 24-hour weather channel is delivering local weather news. How could a weather network broadcasting out of a single studio headquarters provide timely, detailed local forecasts—something potential viewers in all categories agreed was essential—for a country as large and meteorologically varied as the United States?

The Weather Channel and Landmark Communications resolved the dilemma through an ingenious adaptation of satellite technology called the Weather STAR, the last word an acronym for "Satellite Transponder Addressable Receiver." The STAR system is a series of powerful computers, each the size of a VCR, that are placed across the country at local cable providers. Each STAR is coded to extract local weather information from the Weather Channel's satellite signal. Eckert explains: "These local, or zone, forecasts originate with the National Weather Service, and they flow to the Weather Channel via a private weather company. We process them through our computers, beam the whole package up to the satellite, and then the satellite beams it down to the local cable provider, where the STAR identifies and extracts the appropriate local forecast and sends it out to viewers." And voilà: your local forecast, popping up in all-caps teletext every ten minutes to the strains of easy listening music.

When the Weather Channel started, it was customizing forecasts for about 800 different zones, but that number has jumped to 9,000 as a result of advances in technology. Which means that when the national broadcast breaks for the local forecast "on the 8's" (eight after the hour, eighteen after, and so on) there can be

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In a satellite uplink truck at Wrightsville Beach, North Carolina, engineer Victor Cox and field producer Laureen Chambliss prepare for a live hurricane update broadcast.

as many as 9,000 different versions of the Weather Channel flickering away on America's televisions.

As Weather Channel producers discovered when ratings soared after their first live crew covered Hurricane Elena in 1985, viewers are mesmerized by the unpredictability, the immediacy and the potential danger of a field meteorologist literally braving the elements. Of course, some viewers are mesmerized by the Weather Channel no matter what the atmosphere is doing. CEO Eckert reports that while the average viewer watches 13.2 minutes on a typical "uneventful" day, a small but committed portion of the audience turns on the Weather Channel and leaves it on for three to four hours at a stretch. Software engineer Frank Blau, from Issaquah, Washington, is one of these heavy, frequent users. "There have been times in my life when I watch all night," confesses Blau, a fairly serious weather nut who carries a lightning detector in his car and whose license plate reads "SVR WX" (severe weather) with a license frame that boasts "I'd rather be storm-chasing."

Today, the ranks of these regulars are being swelled considerably by viewers who want to know when and where Hurricane Bonnie will arrive. That anticipated arrival has been top priority at the Weather Channel for over a week now. Bonnie, like most Atlantic hurricanes, originated off Africa as a "tropical wave."

John Hope first noticed the tropical wave that spawned Bonnie on the weekend of August 15. As the system began to pull itself together and intensify into a tropical depression (sustained winds topping out at 38 mph) over the next few days, Hope alerted the key players in Atlanta. One of the first to get on board was assignment manager Patrick Walshe, who has the job of placing and coordinating the Weather Channel's field crews. By Saturday, August 22, Walshe was giving Bonnie, the newly christened hurricane, his undivided attention. "At some point over the weekend we decided we were going to deploy three live crews," says Walshe, "and then it became a question of lining up the satellite trucks." The Weather Channel laid out nearly $1 million on its own "Storm Tracker" satellite truck in 1997, so Walshe only had to scramble for two more. But as he knew, when Bonnie became more newsworthy, a lot of other television producers would be scrambling, too.

By Monday morning, August 24, the plan was set—Keneely to the south in the Wilmington area, Jim Cantore in the middle near Morehead City, and Jeff Morrow to the north at Nags Head—and then Walshe spent the better part of 12 hours "in the trenches" lining up rental cars and

hotels, coordinating satellite space, briefing field producers. "It's hard to be patient when I'm sitting here fretting that the storm could go anywhere," adds Walshe. "At some point you have to let the plan evolve."

THAT POINT IS NOW. AS DUSK slides in from the Atlantic, he is on the phone for the umpteenth time with producer Laureen Chambliss, patiently but firmly explaining that no, they cannot set up at that funky little motel overlooking the Intracoastal Waterway (the parking lot flooded two years before during Hurricane Fran) and yes, there's another place a half-mile inland, fortuitously named the Landfall Park Hampton Inn and Suites, and this is where he wants them for the 8 P.M. update, even though Keneely has his heart set on a watery background. The choice of location is crucial, for wherever the crew land now is where they'll ride out the storm.

As it turns out, the Landfall Park Hampton is not as bad as Keneely and Chambliss feared. The parking lot is fringed with tall skinny trees that will bend over sideways once the wind reaches gale force, an oversize American flag out front adds another wind-sensitive visual, and there's a large awning outside the reception area where Randy Frostig can keep the camera and lights dry while shooting Keneely getting drenched. The motel is full with evacuees from the islands who have been glued to the Weather Channel all day. They are glued to it now as Steve Lyons intones ominously, "On the coast of North Carolina, the effects of Bonnie will be felt around daybreak."

Daybreak, such as it is, arrives on Wednesday without Bonnie. But it's close, really close. Keneely, going strong on $2\frac{1}{4}$ hours of sleep, has been on the air since 4 A.M., building suspense. Finally, around 7:30, nature begins to cooperate. A steady rain has set in, the Landfall Park's lights are flickering, and the trees in the parking lot are bowing like ballet dancers in graceful, synchronized waves. "It's wet, windy and getting wild," Keneely tells the camera.

Even though Bonnie is the story of the day, around the Weather Channel there is still a whole continent of weather to cover, and throughout the network's 8,500-square-foot forecast center and studio, meteorologists, directors, producers, headline writers, engineers and graphic designers are all on hand to make sure that the show goes on. But Hurricane Bonnie clearly has everyone's attention.

Digital technology transforms the blue facade behind Rich Johnson into a weather map on-screen.

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RIGHT BEFORE HE GOES ON THE air, Lyons huddles briefly with on-camera meteorologist Jeanetta Jones to go over the hurricane report they'll present together. "Why don't you lead off by asking me about the latest storm track and then we'll get into surge potential," Lyons tells her. Then they head over to the Severe Weather Update Desk, clip on their mikes and sit down in front of the fixed-position cameras (no camera operator needed). The underlying message Lyons wants to convey is that while this storm means business, it's not another Hurricane Andrew.

Bonnie's first real gust rips through just before 8 A.M. When Keneely steps out into the storm for the 8 A.M. update, his little sheaf of notes instantly melts in the driving rain. "Wrightsville Beach has gone vastly downhill in the last hour," he tells the camera. "We're getting gusts of 50 to 60 mph."

From here on it just keeps getting worse—or better, depending on your perspective. At 10:22 the lights in the Landfall flicker, come back on, and finally die for good. The wind has taken on an unearthly keening sound punctuated by the explosions of transformers. The rain, driven sideways, feels like pellets lashing against exposed skin. "Stall" is the word that flits through the lobby. Everyone has been expecting this for hours, but it still hits with a dull, numbing thud: guests, staff, the Weather Channel crew, they're all stuck here until the elements relent. Inside or out, there's nothing but weather.

The crescendo builds steadily for the next 3½ hours until, by 2 P.M., Keneely estimates gusts of 75 mph at the Landfall and up to 90 on the water. The rain is coming down in torrents. "You can hear trees cracking every five minutes," he tells viewers as Frostig pans over to the tormented trees behind the parking lot. And then, just minutes after Keneely goes off the air, Bonnie improvises a bit of

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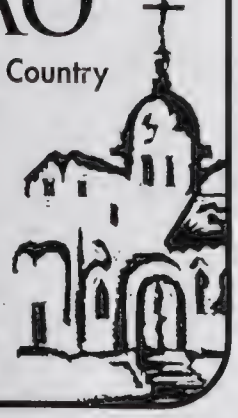

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perversely inspired theater: about ten yards from where Keneely has been standing, a huge live oak tree gets caught in a gust and crashes to the ground, landing directly on the Weather Channel's rental van and crumpling the car's right side. Fortunately, nobody is inside.

MEANWHILE, BACK IN ATLANTA, all hell is not breaking loose. True, Lyons has not had a bite to eat all day or a moment to go to the bathroom as he spins in a vortex of media interviews, half-hourly updates, phone calls and conferences—yet the pace around the TV studio is calm, deliberate, measured. No shrieks of "Get me that latest model run!" No hysterical sprints down the corridor. Late in the afternoon, John Hope comes in to relieve the exhausted Lyons, and the two of them huddle for a while and compare notes. Bonnie has all but stalled for the moment, but they expect that the storm will eventually come inland a bit north of Wilmington and drift north-northeast up the Outer Banks. The strongest winds should kick up right about where Jim Cantore is stationed in Morehead City.

And this is exactly what happens over the course of Wednesday night and into Thursday. Bill Keneely finally goes off the air after 11:00 P.M. on Wednesday night, having faithfully done 38 half-hourly updates over the past 19 hours (he skipped the 8 P.M.). While he gets his first chance for a full night's sleep since Sunday (in a veritable sauna of a room without lights or air-conditioning), the storm rages on and on. In the end, the most remarkable thing about Bonnie is how much time it spends over land: the storm takes 24 hours to churn up the North Carolina coast, its front end over land, back end on the water, before delivering a vicious parting shot at Norfolk, Virginia, on Thursday night.

By Friday, Bonnie is weather histo-

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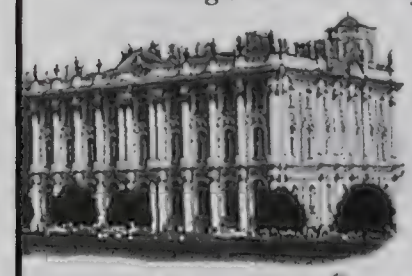

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Bill Keneely breaks between his live reports on Bonnie's progress at the aptly named Landfall Park Hampton Inn, only a mile inland from the hurricane's expected landfall.

ry as far as the Weather Channel is concerned. The postmortem around the studio is that this "event" was a bit of a disappointment, though no one uses that word. Still, even a wimpy hurricane is a force to be reckoned with. Three people died as a result of the storm, including a 12-year-old girl who was killed when a tree fell on her house in Currituck County, North Carolina. Nearly a million homes and businesses on Virginia's and North Carolina's coastal plains went without power at the height of the storm.

BACK AT THE WEATHER CHANNEL there was a different set of statistics to mull over. Wednesday, Bonnie's landfall day, brought the largest viewership in the station's history, with an average of 1.1 million people tuning in at any given time, about four times the fair weather norm. And the Weather Channel's Website was jammed with an estimated 98 million hits, making it one of the Internet's most popular places to be that day.

While CEO Michael Eckert is obviously proud of these numbers, he beams the most when he talks about how the Weather Channel has saved lives over the years. "One of the Weather Channel success stories I'm proudest of," he says, "concerns two young kids in Vincennes, Indiana. They were home alone when the tornado warning went off and they turned on the Weather Channel. Our on-air people were giving tornado safety tips, one of which was to lie down in the bathtub and put a mattress on top of yourself. The kids did this and they lived, even though their house was hit by the tornado and destroyed."

And it's all due, believes Eckert, to the dedication of his staff. "The deep passion our meteorologists have for

weather is mind-boggling," he says. "They've never lost that childhood wonder. When a thunderstorm blows through Atlanta, they run out into the parking lot to watch it."

These are the "weather weenies." Bill Keneely is definitely one, and Matt Crowther and Betsy Abrams, the husband-and-wife senior meteorologists who spend every spring vacation chasing funnel clouds in Tornado Alley, are big-time weather weenies, and John Hope and Steve Lyons, in their own more subdued, academic way, are weather weenies, too. Even before Bonnie has blown out to sea, all these folks and scores more like them at the Weather Channel are eagerly anticipating the next major event.

Seattle-based David Laskin has written two weather books, Braving the Elements *and* Rains All the Time. *Photographer Alex Quesada hails from Coral Gables, Florida.*

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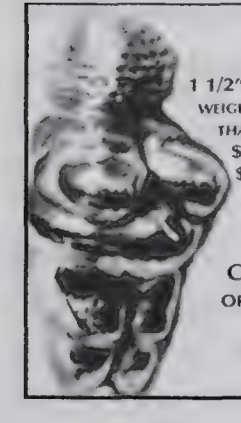

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BOOK REVIEWS

Fall of the Phantom Lord

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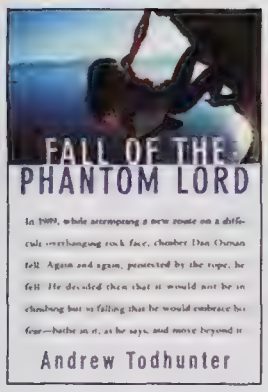
"AT DAWN ON HIS THIRTY-SECOND birthday, rock climber Dan Osman is poised to break the world record, his own, for a free fall from a standing structure." So begins *Fall of the Phantom Lord*, and we are warned: this book is about craziness—a craziness that ultimately would consume Osman. This is a chronicle of rock climbers for whom mere cliffs prove to be insufficiently frightening.



We meet Osman standing on the girders of a Northern California bridge. He wears a mountain climber's body harness, attached to 660 feet of climbing rope, tied to an anchor. Osman is 700 feet up, skyscraper height. He is about to jump. "The beating of his heart becomes unmanageable and he stops," writes Andrew Todhunter. "He clings, closes his eyes, and fights for air." Osman is scared. That is one of the book's saner moments. He ought to be scared. Not only does he mean to jump off this bridge, explains Todhunter, but on the way down "he will execute three cartwheels; in the middle of the third cartwheel he will twist his body and wrap himself one full turn in the rope. He will then unwrap—calmly, methodically, he will not thrash, he will not thrash—and extend his limbs, relaxing as he enters the point of impact."

Why do this to yourself?

True, many of us, as kids, sampled nuttiness. Perhaps we clambered up a factory's brick side to its roof, or jumped ice cakes in a river, or drag raced. But we matured into timidity. Just living, we learned, is chancy. Crossing a street, inattentive driver—whomp! Routine physical, surprise telephone call—cancer! Is that egg fully cooked? Is this airliner banking too steeply? Who comes toward me on this dark street?

We do not seek fear. Low-grade fear is our background music. But Dan Osman craves intense fear, high doses. He is in fact a fear addict.

This book mulls the impulse to wrestle with the fear of death—its titular "Phantom Lord"—and to exorcise it. The means is secondary. When he is not plummeting from trestles, Osman jumps from treetops. And he is a top rock climber. "When I step onto the rock, my senses immediately sharpen," Osman reports. "The taste in my mouth becomes vivid."

Mostly he "free climbs." He ascends cliffs, using nothing but natural cracks and knobs. On perfectly smooth rock, even Osman must resort to "aid climbing," drilling in bolts as he goes. But he frequently scales routes unaided that others have done only with aids, so that the route, as he puts it, "goes free." On the book's cover we see Osman, high above a blue lake, wiry as a spider monkey, clinging to an overhang by his toes and the fingers of one hand.

A "static move," we learn, is a gradual shift of the climber's weight to the next position. A "dynamic move," or "dyno," is a lunge, when the next handhold is beyond reach. One legendary climber—ironically, he died in a car accident—trained himself to lunge to holds with room for just one

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finger. High up on a cliff, he timed his lunge so perfectly that his finger slid into the hold at his leap's apex, when he was momentarily weightless, neither rising nor falling.

There is "bouldering," low-to-the-ground climbs of substantial difficulty and minimal danger. We learn that "mixed climbing"—traversing ice together with rocks—is in vogue. "Mountaineering" is the ascent of entire peaks, often over many days. We learn about German techniques, and French, about roping methods, "crack climbs" and "slab climbs." By the book's end we know something about "lie-backs" and "underclings," "pinches" and "side-pulls," "crimpers" and "jugs."

We also learn that, at age 9 or 10, on a hunting trip with his policeman father, after dark, little Dan Osman became lost. He screamed for his father. From behind a tree, his father suddenly appeared, and struck him. "The only thing you need to fear out here," he told his son, "is me." By age 12, Dan began the climbing that would take over his life. In 1989 he began falling on purpose, to embrace his fear. Bathe in it, he says. Embrace it, Osman did. This past November, soon after the publication of this book, the climber fell to his death.

Andrew Todhunter begins this book as a single young man, mesmerized by risk and by Dan Osman. By the end, Todhunter is married, with a newborn daughter. He reaches a decision: he will not emulate Osman and jump off a bridge. It is tempting. "But the jump, in the end—and what it has to offer—isn't worth it," Todhunter decides. Watching his daughter born, a difficult birth, has proved more terrifying than bridges or cliffs. If he ever again wrestles with intense fear, he believes, it will be at sea level, "in one of the many quiet rooms and corridors of ordinary life."

Richard Wolkomir writes often for Smithsonian. *He is based in Vermont.*

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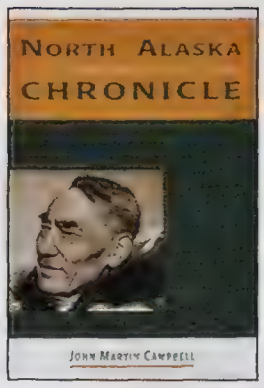

North Alaska Chronicle

John Martin Campbell

Museum of New Mexico Press,

$45; $29.95, paper

THE TRADITIONAL SOCIETY OF NORTH Alaskan Nunamiut Eskimos vanished in the 1970s. By their own account, their culture had endured in scattered communities on the Alaskan tundra since time immemorial, and their stories included references to woolly mammoths and the Great Flood. The anthropologists and archaeologists who had studied Nunamiut society believed that it had inhabited its traditional territory, in the central Brooks Range, for only some 200 or 250 years, but they discovered no evidence as to where the Nunamiut originally came from.

Such mysteries and contradictions remain a part of the hazy history of the Nunamiut, in stark contrast to the fact of the culture's disintegration and demise. Both the history and the loss are wonderfully evoked in John Martin Campbell's *North Alaska Chronicle*, a book in which science and scholarship are handmaidens to the drawings and stories of a Nunamiut native, Simon Paneak.

Campbell, a former Smithsonian Institution research associate and now chairman of the anthropology department at the University of New Mexico, first met Paneak in 1956, as a graduate-student member of the Yale North Alaska Expedition. From their first encounter in an Eskimo camp on the Arctic Divide, the two men remained "friendly correspondents and fellow travelers" until Paneak's death at the age of 75, in 1975.

Along the way, in 1967, Campbell asked Paneak to make a set of drawings recounting Nunamiut tribal his-

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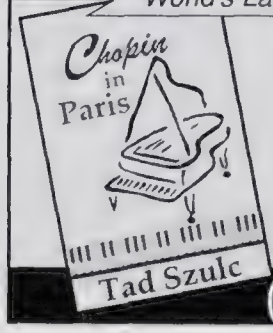

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tory, leaving him with a sketchbook and some pens, pencils and crayons. During the next winter, Paneak filled almost a hundred pages with sketches and text, including "children's stories, accounts of ancient tribal events, the food quest, clothing and housing, fur trapping, travel, and traditional tools and weapons." In *North Alaska Chronicle*, Campbell provides brief background chapters on North Alaska and the Nunamiut Eskimos, but the heart of the book consists of Paneak's drawings and handwritten notes.

Campbell writes lucidly about the facts of Nunamiut life. He describes, for example, the criteria for establishing a main encampment in the sparse North Arctic terrain: caribou meat was the most important staple of the Nunamiut diet, so an encampment had to be sited on one of the caribou's favorite migratory routes, where animals could be killed while migrating both north to the Arctic Slope and again south into forestland. The camp also had to be on or near the shores of one of the scarce lakes, large and deep enough to hold lake trout, as well as near to a source of firewood and poles for building houses. "Willows, too, can be scarce," Campbell writes. "Our own experiences include hours of tundra travel (both with and without expert Nunamiut companions) in which boiling coffee or tea awaited the discovery of a few willow sticks. An overnight camp calls for quite a few sticks, and a camp of several days requires a lot of them, so one may imagine the numbers of willows necessary to supply a principal Nunamiut settlement."

Once a campsite was settled, it could last only as long as its resources held out. A lake might be fished out, Campbell notes, but the wood usually ran out first. "Sooner or later the camp ran out of willows, a circumstance that necessitated moving bag and baggage to another place whose resources met the required criteria. And once the willows were exhaust-

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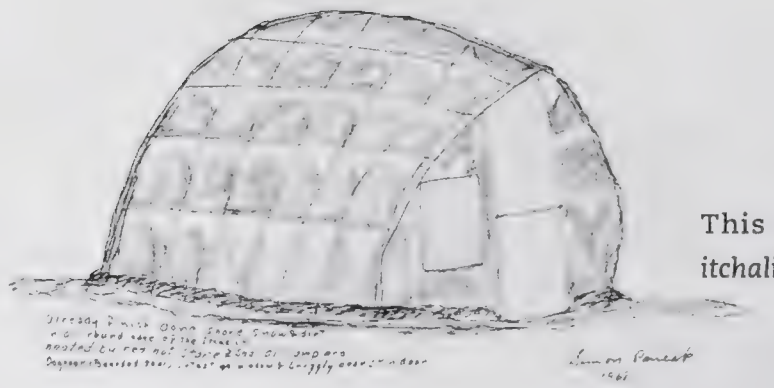
ed, it took several human generations for them to grow back."

Paneak's drawings provide a record of Nunamiut tribal memory as well as the practical arts of survival in the tundra. There are fabulous illustrations of how an early Nunamiut hunter learned to kill a mammoth. There are whimsical drawings of the first mosquito parents, and how they tried to keep their hungry children locked up in the house all spring, so the little ones wouldn't freeze when they flew off to find blood. There are detailed drawings of tools, of men's and women's winter clothing; diagrams of a caribou hunt or the construction of Nunamiut houses, and maps of the best rivers for fishing. In the long winter during which he made these drawings of a living culture, Paneak may not himself have imagined how soon his work would become an epitaph for his way of life.

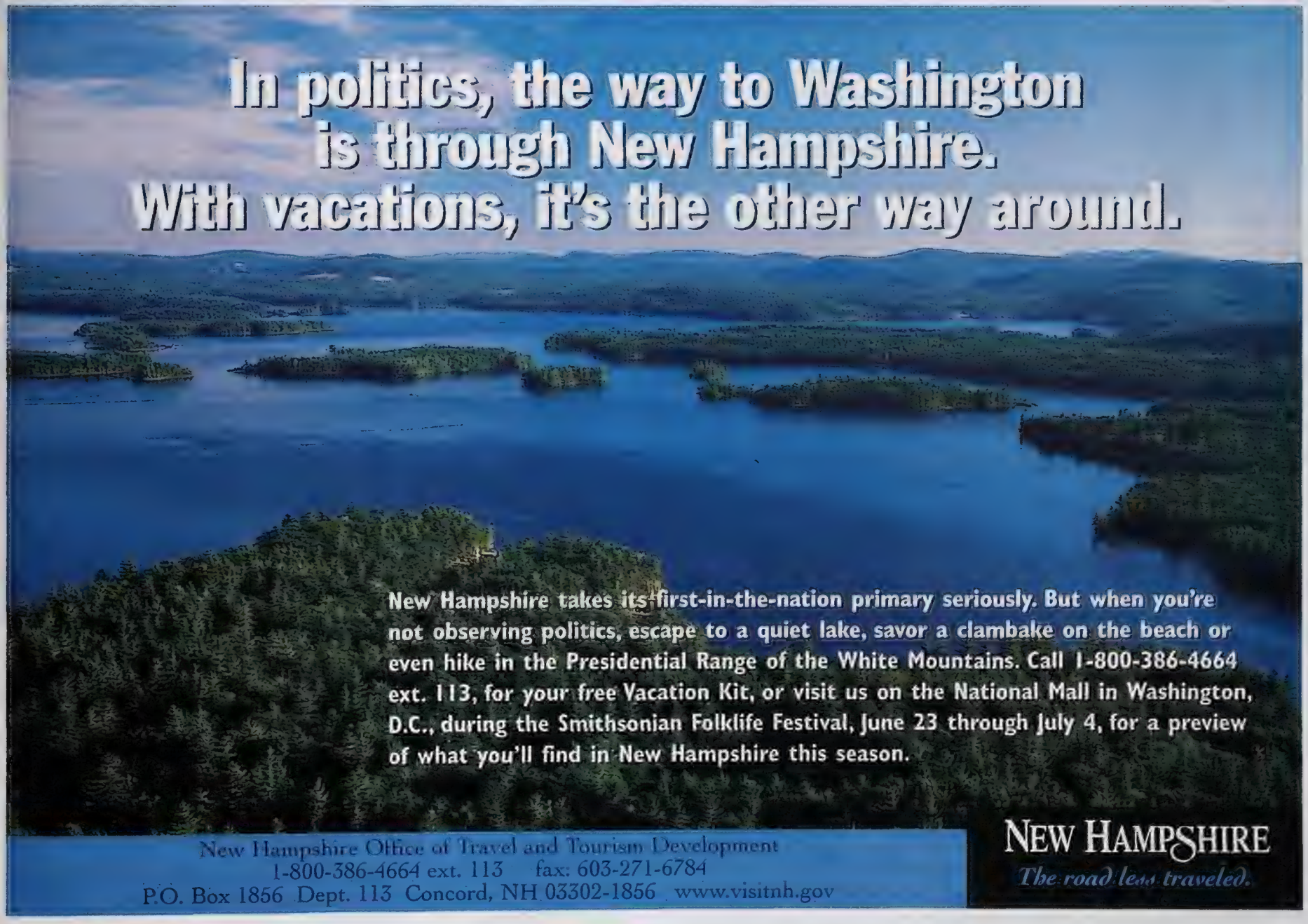


This drawing depicts a Nunamiut *itchalik*, or caribou-hide tent.

In the end, it wasn't the harsh Arctic conditions, or the scarcity of trout or willows, that did in Nunamiut society. In the 1970s, the Alaska Native Claims Settlement Act, along with construction of the Trans-Alaska oil pipeline, provided Alaska natives with land, formally organized village and regional corporations, large cash awards (to both tribes and smaller communities), and to some of them, including the Nunamiut, lucrative jobs on the oil pipeline. "These encroachments and their opportunities caused transformations in Nunamiut life of astonishing proportions," observes Campbell. "On my most recent visit, in 1985 . . . the Nunamiut encampment had become a modern town of platted streets, split-level homes, home telephones and television sets, a hotel, and a restaurant."

Campbell admits that, in lamenting the disappearance of traditional Nunamiut life, he is both a romantic and an outsider. "Nothing will bring it back," he writes, "and even if a return to the old ways was possible, neither big government nor the people themselves would allow it." In *North Alaska Chronicle*, Campbell records the way it was, and Simon Paneak's drawings take on a life of their own.

Reviewer Paul Trachtman writes from his home in New Mexico.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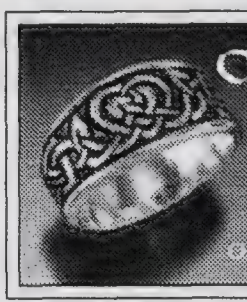

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THE LAST PAGE

Crazy? No, Just One Card Shy of a Full Deck

BY ROY SORRELS

THE FIRST CARDS IN MY COLlection came from a three-card monte man on 14th Street in Lower Manhattan. Queen of hearts, queen of spades and queen of clubs. "Follow the red, follow the black," he chanted. "Find the red, Fred, you make some bread, Fred—choose the black, Jack, can't give no money back!" A lookout cried, "Cop!" and the man hurriedly pocketed the cash, kicked over his cardboard boxes and ran off. He left behind the three cards. I palmed them into my pocket.

It was the beginning of my yearlong hunt for one full deck of found playing cards. I created the rules. I had to find the cards on the sidewalks or streets of the city of New York, any borough. I could take no more than three cards at a time.

I loved my game. I brought my cards home and began to glue them together in a fan-shaped mandala on the wall over my desk. At first my friends were amused at me, on my hands and knees on sidewalks and streets at all hours, picking up cards. I asked around and nobody knew anybody who'd ever collected a deck of cards from the streets of New York. I had become what every New Yorker secretly longs to be, a harmless, amusing eccentric.

But then my friends began to be annoyed. They asked why I was doing this, exactly. At first, I scrambled for an answer, but the truth was I didn't know.

I had become what every New Yorker secretly longs to be, a harmless, amusing eccentric.

I was reading-matter-deprived on a recent flight, so I read every word in something called the *SkyMall* catalogue. Thing after thing was described in breathless cataloguese, with what exactly it did, what it was good for and why my life would be richer if I bought it. One of the devices on sale was an electronic doodad that, by satellite, could tell me where I was on the surface of the planet, within a hundred feet. Why, I wondered, did that make me feel eerily disconcerted? No more getting delightfully and creatively lost? No more wandering away from certainty?

Aha! That was the answer to my friends' questions. I want to spend at least part of my time doing things that don't necessarily make sense. Perhaps it's my way of rebelling against a world in which everything must be useful. I need in my life something mysterious that can't easily be explained.

Finally, after a full year, I had all but the three of clubs. I continued to find cards, plenty of them, but weeks passed and still no three of clubs. I became melancholy, desperate. I needed the three of clubs. The city was holding out on me; fate was toying with me.

Then one day I was back on 14th Street. The same three-card monte man was juking and jiving. "Follow the red, not the black . . . find the red, Fred, you make some bread, Fred." I stopped 20 feet away from him and yelled "Cop!" He kicked over the boxes and ran.

The three cards fell to the sidewalk, facedown. I walked to where they lay. Spades you lose, hearts you lose, but my man, my man, you got to choose. On my hands and knees, I turned over the cards.

Everyone ignored me, just another guy kneeling on a New York sidewalk, crying and kissing, for his own sweet reasons, the three of clubs.

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